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# Bonus and Rating for Works Executives

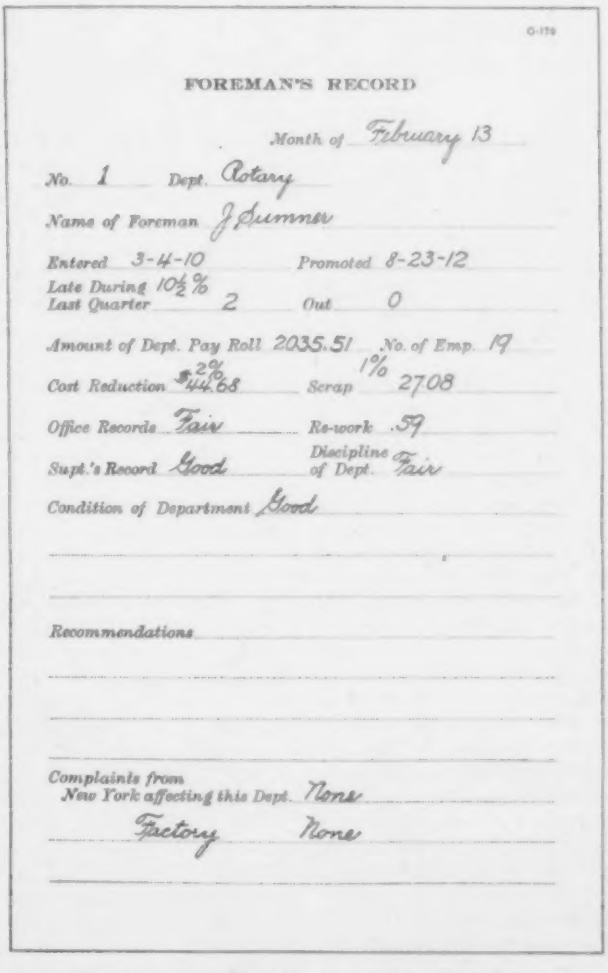
## Rewarding Efficiency with Money, Which is Reduced Automatically with Remissness—Ranking Foremen to Determine Their Salary Increases

BY JOHN NELSON

The Royal Typewriter Company, Hartford, Conn., has developed a bonus system for rewarding the heads of the various departments for increased efficiency. In conjunction with various other elements of management the system acts also to procure the rating of the foremen. The bonus plan applies to the superintendent and his assistant, the office manager, the chief inspector and the foremen, numbering 29 in all out of a force of 890 employees. The rating system affects the foremen only. It determines automatically which men of this class shall be given an increase in salary at the end of each year. The three who stand highest are advanced; the remainder must be contented with their previous salaries. They are competitors. Each is making every effort to procure the maximum of efficiency in his department, for by so doing he insures a full return to him of his share of the bonus appropriation, as well as the probability of his being one of the fortunate three whose income will be increased. His endeavor must extend farther than this, for other factors enter into his rating, including personality, appearance, aggressiveness, organization and concentration. By personality is meant such characteristics as tact, mannerisms and personal magnetism.

### The Bonus System

This bonus system, which was worked out with painstaking care by General Manager Charles B. Cook and his assistants, is wholly original. It has nothing to do with the workmen, most of whom are employed under the premium plan which has been developed successfully in many manufacturing establishments, by which they divide with the company the saving in cost from a fixed base price. Their superior officers, however, are rewarded on an entirely different basis. The company has set aside some thousands of dollars which it divides among the executives in the ratio of their salaries in quarterly payments. The sole condition is that the beneficiary shall deliver a maximum of results determined by the management. For each failure he loses one point, and a point means a deduction of 50 cents from his share of the bonus. That is to say, if a man's apportionment is $100, a lost point means a reduction to $99.50, and so on down. The money so deducted does not remain in the bonus fund for future distribution, but goes back to the company's treasury. But the company does not want it back; on the contrary, the feeling is one rather of resentment, because the failure of the men to earn the money means that they have not succeeded in securing a maximum efficiency. This is clearly stated in a letter recently sent out by the manager, in the sentence: "Remember, you can make more than the bonus (quarterly) just received, and the more you make the better you will please the company."



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FOREMAN'S RECORD

Month of February 13

No. 1 Dept. Rotary

Name of Foreman J. Sumner

Entered 3-4-10 Promoted 8-23-12

Late During Last Quarter 10½% 2 Out 0

Amount of Dept. Pay Roll 2035.51 No. of Emp. 19

Cost Reduction 2% $44.68 Scrap 1% 27.08

Office Records Fair Re-work .59

Supt.'s Record Good Discipline of Dept. Fair

Condition of Department Good

Recommendations

Complaints from New York affecting this Dept. None

Factory None

Fig. 1—The Executive Monthly Record and the Premium System

The system has been in operation for nine months only, yet a large increase in efficient production has been made, and an interesting knowledge of the psychological aspect of the idea has also been obtained. The men recognize the generous purpose of the company. They are anxious to retain their entire share of this money, not only for the pecuniary benefit which accrues to them, but because of the proof entailed that they are successful in their management. The 50-cent deductions are disliked the more because the money goes back into the company's treasury. The system would probably not work as well if the money were retained in the bonus fund. The men feel much as if they were throwing half-dollar coins into the ocean.

### The Rules of the System

The rules of the bonus system in relation to elements dependent upon the book records are as follows:

*Increase or Decreased Cost.*

Take one point on 1 per cent. increase.
Give one point on 1 per cent. decrease.
Leave off point in cost increase and decrease.
Indirect departments. (Indirect labor, such as millwright tasks and general repairs are not penalized.)

*Lates*—Take one point off of 25 per cent. late.

Give one point 5 per cent.

*Outs*—Take one point off of 15 per cent. out.

Give one on 3 per cent.

*Scrap*—Take one point off on 1 per cent.

Give one point less than ½ per cent.
The value of the scrap to be proportioned against the department's entire expense (including overhead cost which is controlled by the department's head).

*Rework*—(Not spoiled and can be made good.)

Bonus or forfeit same as scrap.

The figures from which the points are determined are compiled monthly. The bonus is paid quarterly. If the cost of a department increases 1 per cent. or more, in ratio to the product, the foreman loses 50 cents. If he does not increase costs as much as 1 per cent. his bonus is not impaired. The rules of the system are somewhat misleading, for to "give one point on 1 per cent. decrease" yields no greater return in bonus than does the maintaining of expense at the old level. However, the results and superintendent's records; the general condition and discipline in the department, and the complaints that have been entered either from the main office in New York or from the factory. Against each of these items each month an entry is made, represented by the little circle with the numeral within, which tells graphically whether the head of the department has lost or gained a point. If he has lost it, the entry is in black ink; if he has gained it, in red ink. For example, in this sample chart it will be noticed that in January and February the cost of the department increased, in consequence of which a point was lost each month. But in March the costs were reduced and a point was gained. The same was true with the scrap; the percentage of loss of material in January and February was excessive, according to the bonus standard, but was kept within limits in March. The illustration cannot indicate the different colors, but the dotted circles have been employed for red marks.

### Watching the Departments

The departments are watched very carefully in order to insure the discovery of failures on the part of the responsible persons as well as to learn where progress is

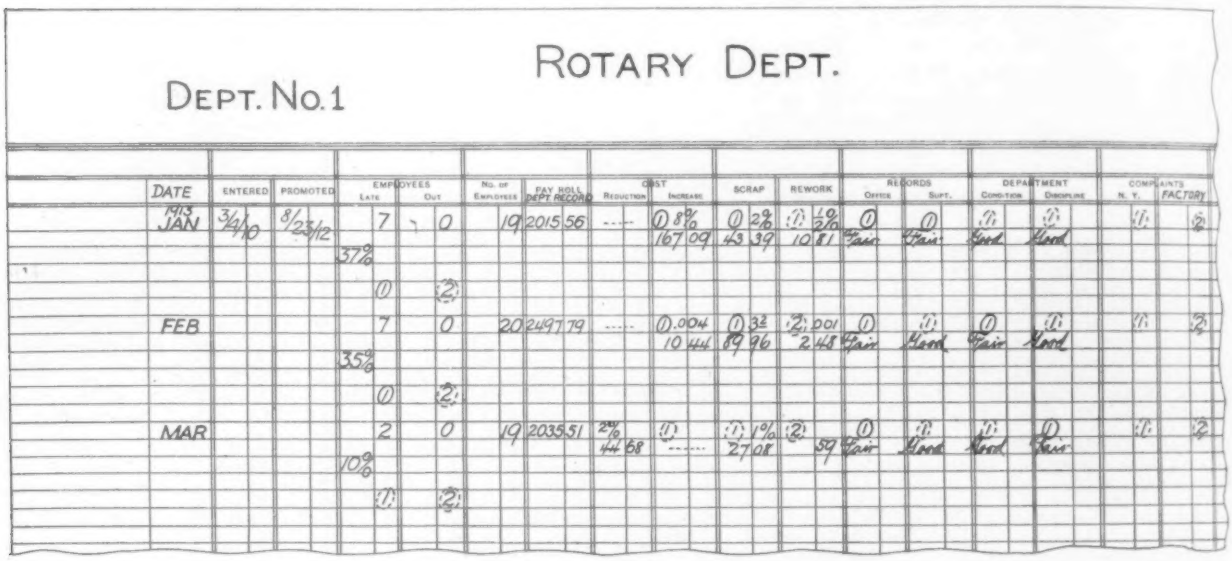



Fig. 2—The Departmental Record of the Premium System

figure conspicuously in the case of the foremen in establishing their wage rating, so that their constant study must be to achieve more economical methods of manufacture and improved general conditions.

The "lates," the instances of tardiness, must not exceed a number equivalent to 25 per cent. of the employees in the department. The limit of lost half-days is 15 per cent. on the same basis of reckoning. The scrap is valued against the department's total expense. Certain corrections are made where a foreman has more than one department, or where his department is very small, the points being divided into fractions to insure fairness. While one department may be larger than another, no unfairness exists, for responsibility as to product in a small department balances mere numbers of workmen doing simple work.

The general standard upon which efficiency is based is set forth in sufficient detail in the following paragraph of the company's "Foremen's Rules and Regulations:" "Your standing with this company is rated on ability (executive and otherwise); decrease in cost of production with quality unimpaired; character of employees in your department; amount of scrap or rework; lates and outs of your department; order and methods; office and superintendent's records; condition of your department; enforcement of the factory rules and regulations."

Each month the record of each head of department is compiled upon a blank form as shown in Fig. 1, and the totals are transferred to the record sheet, Fig. 2. This contains the dates when the man entered upon his work and when he has been promoted; columns for the number of employees who are late and absent; the total number of employees and the amount of the pay-roll; the reduction or increase in the total cost of the department; the amount of scrap and rework; the condition of office being made. The active men in the management while in the works always carry with them the memorandum card, both sides of which are shown in Fig. 3, and any observation which is of value is immediately jotted down so that nothing need be intrusted to the memory. These cards are in two colors, those of the manager being buff and those of the superintendent and his assistants white.

An examination of some of the monthly records revealed such entries as these: "One point deducted, pulling down shades before time allowed on three occasions, compelling others to light lamps"; "one point deducted, work bench dirty—shoes on benches"; "one point deducted, men cleaning up"—in other words, cleaning up before the close of the working day; "one point deducted, motor left running after 5 o'clock"; and "one point for unnecessary argument"; "one point lost, broken promise on part shipments"; "one point off for doing work for another department without superintendent's permission."

The heads of the various departments are urged emphatically to effect an organization so complete that their absence will not result in confusion and decreased production. If the department head is ill or has to be away for other reasons, and if the assistants through lack of knowledge of the details of management are unable to maintain the required standard, two points are deducted from the department's bonus. Some men have a theory that their own positions are made more secure by keeping their subordinates ignorant of the duties which may be thrust upon them from time to time, and the company is doing its best to stamp out such a condition.

At stated times, known only to the manager and superintendent, an ammeter is put into use to analyze the power of each manufacturing department, to ascertain when after the opening hour such department reaches full

capacity, and when before the closing time work begins to fall off. It has been discovered in various cases that men have been in the habit of ceasing work early in order that they might count their product, when this could have been done in idle moments when production was proceeding. Then, of course, some workmen like to steal a little time at the end of a half day in order that they may get away from the works the more promptly. The ammeter readings have shown failures that have resulted in lost points.

These details indicate with what care the departments are watched in connection with the bonus and rating systems. Results in the comparatively short time since the plan was put into effect prove its remarkable efficiency. Gains have been made all along the line. A striking example is the saving in scrap. Reckoned in dollars and cents, this loss has been cut in three parts, which means a difference of thousands of dollars. The company manufactures some 45,000 typewriters annually, and each machine has 1471 parts involving in their manufacture 5000 operations. Under former conditions the loss in scrap and rework was a large item. In each year an analysis of every operation is made, working from part No 1 up and a complete record is maintained of all operations on every part, and their relation to the assembling of the typewriter.

The reduction in the number of idle hours from absence is another source of saving. The speeding up is yet another essential factor. Altogether the management feels very well satisfied with the system. So do those who profit by it financially. The money is in no sense a gift, but rather the financial return for extra results obtained for the company. To lose 50 cents of the amount is not a fine. It is a failure to achieve a reasonable standard.

DEPARTMENT REPORT. MONTH OF December, '13

DEPT. NO. 1 NAME Rotary FOREMAN J. Sumner

THIS REPORT IS CAREFULLY PREPARED AS A MEANS FOR THE FOREMAN TO STUDY THE INCREASE OR DECREASE OF LABOR AND EXPENSE IN HIS DEPARTMENT. KEEP THIS REPORT UNTIL CALLED FOR.

| LABOR | | | EXPENSE | |
|---|---|---|---|---|
| TYPEWRITER LABOR, Salvd Production | 12376 | 77 | WORK DONE BY CARPENTERS, | 12 41 |
| MACHINERY, | 769 | 12 | " " " PLUMBERS, | 3 09 |
| CONSTRUCTION TOOLS, | | | " " " ELECTRICIAN, | 16 65 |
| B. AND F., | | | " " " MILLWRIGHTS, | 17 01 |
| MACHINERY, | | | " " " TOOL ROOM (Repairs), | 54 29 |
| STOCK, | | | " " " PORTERS, CLEANING, ETC., | 68 13 |
| MAINTENANCE TOOLS, | 11 | 55 | SUPPLIES, AS PER INVOICES AND SIGNED FOR, | 168 09 |
| B. AND F., | | 34 | " Drawn from Stock Room by Requisition, | 274 27 |
| INDIRECT, Including Foreman and Assistant, | 1093 | 41 | DEFECTIVE WORK DONE BY YOUR DEPARTMENT, | 158 71 |
| CLERICAL | 276 | 84 | Rework | 22 58 |
| Rework | 176 | 71 | Investigation | 45 57 |
| Instructing | 73 | 20 | | |
| OVERTIME ALLOWANCE, | 5 | 59 | | |
| Inspecting | 37 | 53 | | |
| Experimental | 231 | 26 | | |
| Shipping | | | | |
| TOTAL LABOR, | 15006 | 85 | | |
| Pay Roll Rework | 276 | 84 | | |
| EXPENSE, | 641 | 49 | | |
| TOTAL, | 15571 | 50 | | 841 49 |

Fig. 4—The Department Report of Monthly Costs

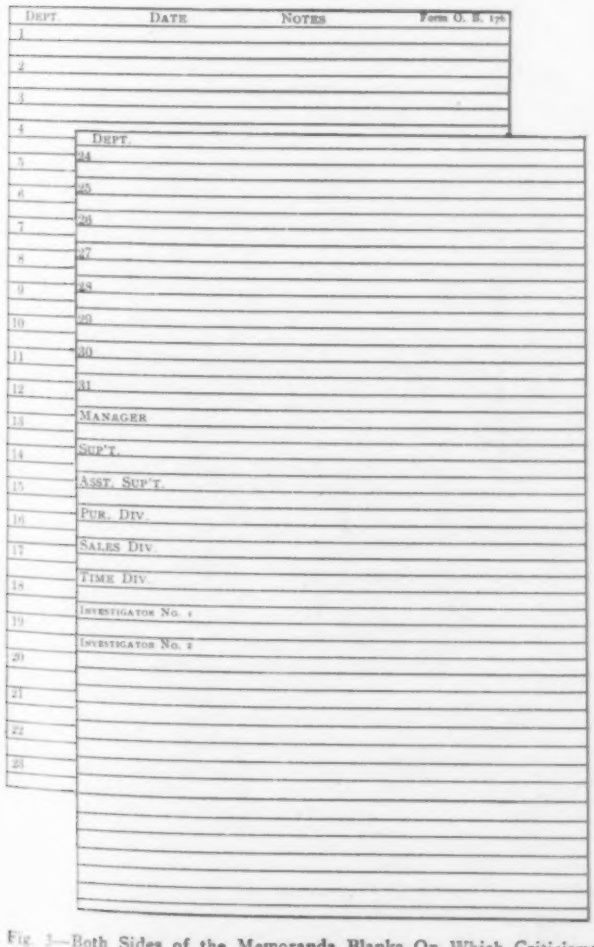



Fig. 3—Both Sides of the Memoranda Blanks On Which Criticisms Are Noted

### The Rating of Foremen

The rating of foremen is a system which might be adapted in many manufacturing plants to their financial advantage. The secret of its success is that the operation is wholly automatic. The personal equation as affecting the management's opinion of a foreman is eliminated. It has been demonstrated conclusively that previous to the establishment of the system the managing officers did not always judge wisely as between the abilities of the various foremen and the results which they were accomplishing. To prove the point one or two men who were held to be among the most efficient heads of departments in the factory have been found to be rather a failure so far as actual results were concerned. Another, who had not come conspicuously to the attention of the management, was not rated nearly as high as he should have been. Luck no longer plays a part in determining usefulness. Salaries of foremen are increased only under this competitive system. Rarely has compensation been raised otherwise. The theory is that a voluntary increase in wage, unrequested, is a much greater stimulus to endeavor than that which is urged by the employee.

The rating of the foremen is determined every six months, but promotion as to salary is made annually. If at the end of a half year a department shows increased cost, the foreman's income is not affected, but he is warned that he must do better, and if he cannot correct conditions and accomplish a decrease he is changed to other work. As only three men are to receive an advance in salary, competition between the departments is keenly active. When it is considered wherein this competition lies, that everything tends toward reducing cost of manufacture, better care of machinery and decreased depreciation; improvement in shop conditions generally, which makes it easier to maintain a working force of good men —then it will be understood that the system must result in direct financial advantage to the company.

In determining the rating, various elements are taken into consideration. Each has its value in points, and the men are ranked according to the number of points which they total. In the first place, the general efficiency as indicated by the bonus system is given a maximum of 100 points. In the bonus records the men are ranked according to the percentage which they retain of their share of the bonus. If a foreman has 90 per cent under the bonus system he has 90 points to his credit in the rating. The other five elements each have a maximum of ten points. As already stated, these are personality, appearance, aggressiveness, organization and concentration. The system does away with prejudice and individual opinion. Where the records do not give exact information, judg-

ment as to the success of a foreman is pronounced by a board of officials, including the general manager.

One important feature in the conduct of this system is the right given to the foreman to see at any time the full records of the expenditures of his department, which constitutes a privilege rarely accorded by manufacturers. Any misconception on his part of charges against his department is quickly removed to his own satisfaction, or the cause of just grievance corrected. He has his own department report, as shown in Fig. 4, and he may see the details of its various items in the company's books. There is a positive check between departments.

# A New Continuous-Running Two-High Mill

## By Alternating Position of Rolls the Mill is Made Reversing With Continuous-Running Electric-Motor Drive

At the May meeting of the Iron and Steel Institute a paper was presented by Andrew Lamberton, Sunnyside Engine Works, Coatbridge, Scotland, describing a new form of electrically driven two-high continuous-running reversing mill. The paper, substantially in full, is as follows:

Speaking generally, where steel works are associated with blast furnaces, and perhaps also coke ovens, and an abundant supply of surplus gas is available for producing electric current at a low cost, electrical driving of rolling mills is clearly indicated; and the question before the engineer then becomes one of the economical design of such plant, both as regards first cost of installation, and economical performance. The greatest difficulty is met with in dealing with reversing mills of the two-high type, where the rolls have to be reversed at each pass, and when these mills are of large size the electrical plant is extremely costly, the reversing mill motors necessary being from 10,000 to 15,000 brake horsepower due to their having to start from rest under full load at each reversal.

We are all familiar with the Ilgner system of driving such mills, first introduced in Germany, and with which

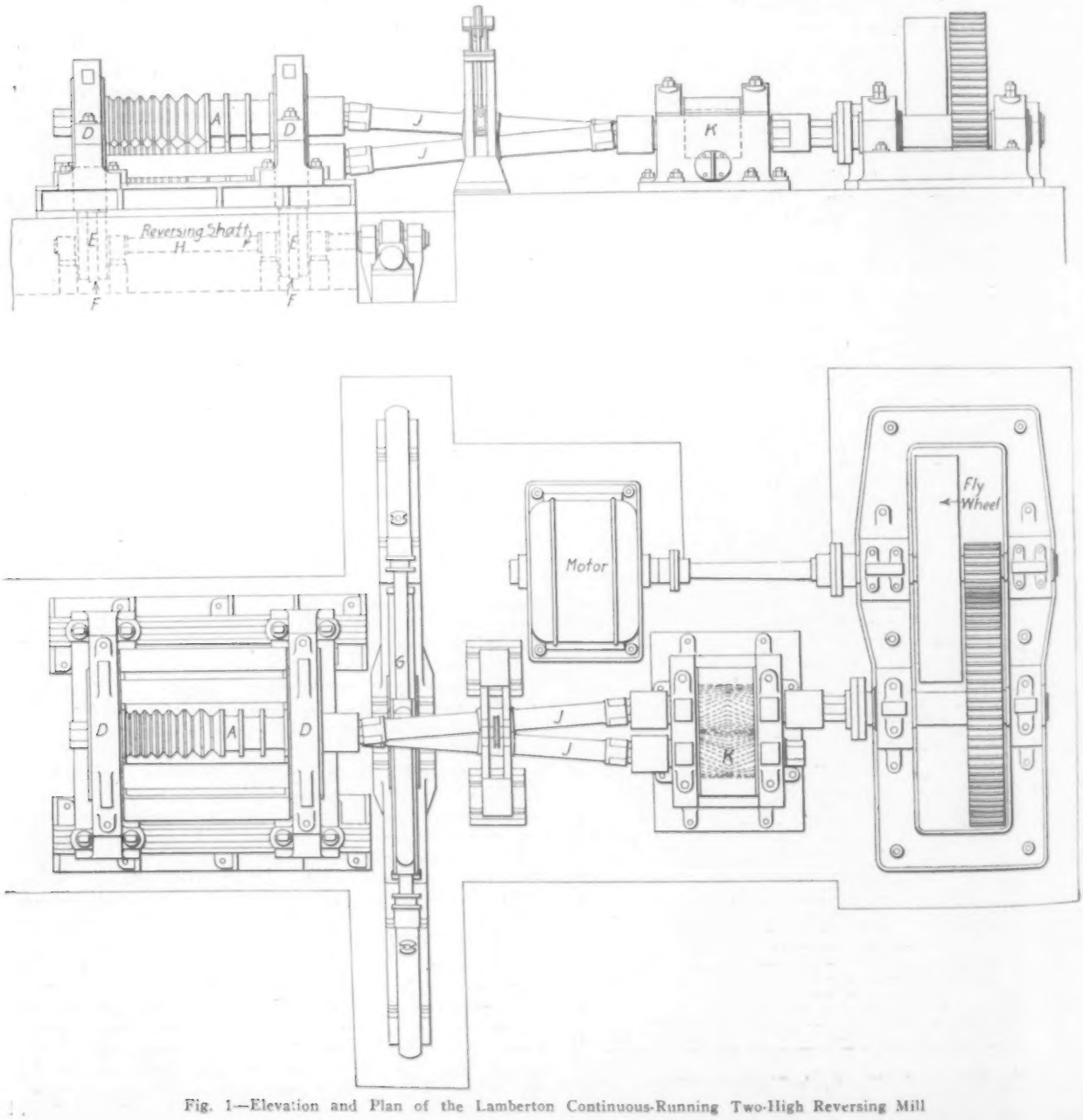



Fig. 1—Elevation and Plan of the Lamberton Continuous-Running Two-High Reversing Mill

Siemens Brothers of London have been closely identified; and several very interesting papers have been submitted by Mr. Ablett of that firm describing such installations. The high initial cost, however, seems to militate against the general adoption of the Ilgner system in this country, as British steel makers seem very slow to adopt it; and it is noteworthy that two of the most recently erected steel works in this country, in both of which blast furnaces and coke ovens exist and an ample supply of free gas is thereby available, although using electricity for every possible purpose, have not adopted it for driving their reversing mills, which seems to indicate that the high initial cost and other considerations have made it clear that this was not in these cases the most economical when all the conditions were fully considered.

All engineers may be said to be in agreement, that where rolling mills can be driven by a constant-running motor associated with a heavy flywheel to take the peak loads of rolling, electrical driving is to be preferred, provided of course that the cost of current be low enough. Look for a moment at some of the main considerations that arise in connection with the adoption of electricity for driving bar, rail and structural rolling mills.

For small mills rolling light sections and bars, which can be fed to the mills by hand, the three-high continuous-running mill is practically universally adopted, and in such cases the driving of these mills by a continuous-running electric motor leaves nothing to be desired. For larger mills rolling bars and sections of heavier type which cannot be fed by hand, and where live roller feeding tables and mechanical manipulators are therefore necessary, the three-high type of mill is not so popular in this country, although it must be admitted that on the Continent and in America this type of mill is quite commonly used even for heavy sections. The main objections, however, are the complicated live roller tables which require to rise and fall at each pass, and the increased difficulty of manipulating the bars on these rising and falling tables. There is also the further difficulty of the exact setting of three rolls to give accurate sections, together with the multiplication of the guides and guards required in this system. These considerations have caused steel makers in this country to prefer the two-high type of reversing mill for such heavy bars and sections, even although the driving of such mills by reversing steam engines is less economical.

This being so, it occurred to the author that if two-high structural rolling mills could be designed to be capable of being driven by a continuous-running electric motor, and at the same time give the necessary reversals to the bar at each pass, this would go a long way to meet the difficulties referred to. The ease of setting the rolls in the two-high mill and the simplicity of the roller tables, being fixed instead of moving, would be conserved, and the large and very costly reversing motor rendered unnecessary. The following is a short description of the method by which this is accomplished.

### The New Mill Described

The root idea of the new system is that if in a mill with two rolls, arrangements can be made to make the bottom roll the top roll, and vice versa, then at each reversal of the position of these rolls there will be a pass in the opposite direction. If then a pair of rolls be mounted in circular gables, which are free to rotate in fixed frames or housings, this will afford a continuous-running two-high mill, which gives reversals at each pass, on the gables being rotated through an angle of 180 deg., or half a revolution.

Referring to Figs. 1 and 2, the two rolls A are mounted in the usual form of chocks B contained in the circular gables C, which gables are free to rotate in the fixed frames or housings D. In order to make the turning of the gables easy, these are carried on broad revolving anti-friction rollers E, placed immediately under the gables, and carrying the weight of the gables. These anti-friction rollers have part of their breadth formed into a spur pinion F which gears with corresponding teeth in the rotating gables. By means of a hydraulically operated rack G

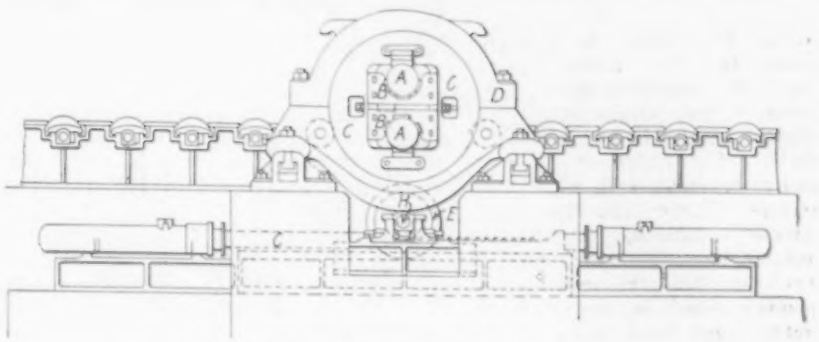



Fig. 2—The Revolving Gables with Fixed Frames

gearing into pinion on the bottom roller shaft H, the rotation of the gables is quickly effected, the time taken being only 3 to 5 seconds, and the stroke of the hydraulic rams is just sufficient to bring the rolls to their exact position at each reversal.

To provide for the alternate change in the position of the top and bottom roll, the driving spindles J, conveying the power from the mill pinions K to the rolls A, are disposed in the manner shown on the drawing, and the weight of these spindles is borne up in their center by a balanced carrying gear, the weight of the descending spindle balancing that of the ascending spindle at each reversal. It will be noted that the mill pinions are placed side by side, and not superposed as is usual, as this side-by-side arrangement reduces the angle on the spindles during reversals.

With regard to the motor, driving gear and flywheel, these are so well understood as to require no description, except to observe that by the employment of a high-speed continuous-running motor the size and cost of such motor is reduced to a minimum; and, as the flywheel takes the peaks of the rolling loads, the highest economy in operation results. In Figs. 3 and 4 the revolving gables with the fixed frames are shown to a larger scale, and the guides and guards for rail rolling are also shown in position.

### Formation of Fins Obviated

An interesting point to observe is that in rolling rails and sections in the ordinary type of two-high mill, it is necessary to turn the bar upside down to prevent the formation of fins, but this is entirely obviated in this new design of mill, because the rolls take alternately top and bottom position, and finning is thereby corrected, so that the turning of the bar upside down is rendered unnecessary, and the operations of rolling simplified.

A plan was shown of the general layout of a rail mill plant on this new system, capable of an output of 5000 tons per week. Three distinct mills were shown: 1.—A blooming mill taking the ingot and reducing it to a bloom. 2.—A roughing mill to reduce this bloom to a roughly formed rail; and 3—a finishing mill to finish the rail to the required section. These mills are all of the same continuous-running reversing type, the rolls having fixed drafts, so that there is no screwing-down gear required. The live roller tables are all fixed tables of the simplest form, and the manipulation of the ingots at the blooming mill, the blooms at the roughing mill and the rails at the finishing mill is of the simplest character. High-speed continuous-running electric motors with suitable flywheels are used to drive each of these mills, and these motors are all of most reliable type and highest efficiency.

The author ventures to think that in such an installation a very high efficiency would be obtained, with the minimum initial cost. The first mill of this new type is now in course of construction, and will be put to work in a large steel works in England in the early summer, when the results in every-day operation will be available; and the author will be glad to give those results in a subsequent communication.

### Specialization in Steel Works Essential

There is, however, another side to this problem of the economical rolling of steel products, which, although it concerns the engineer less than the one just considered, is of the utmost importance to the steel works owner and cannot therefore be overlooked. It is well known that to

obtain the highest economy from any rolling plant, the maximum capacity of such plant must be realized, for if, say in a plant of 5000 tons capacity per week, only an average of 3000 tons is actually obtained, the cost per ton of production on this reduced quantity would be much higher than would have been the case had the maximum output been secured; and it is to be feared that this condition of things is all too characteristic of the rolling mills in this country.

Let us look at some of the causes which go to explain this shortage in output: First, and probably the greatest, are the constant fluctuations in trade, in sympathy with which the demand rises and falls; and second, the fact that the total capacity of existing plants in this country is now much greater than the average demand for their products, with the result that the total quantity of the work placed is split up into numerous small orders that rarely afford an opportunity for a lengthened run on the same section, by which alone a maximum output is possible. This also results in constant changing of rolls for the different sections required, incurring large expense and very great loss of time.

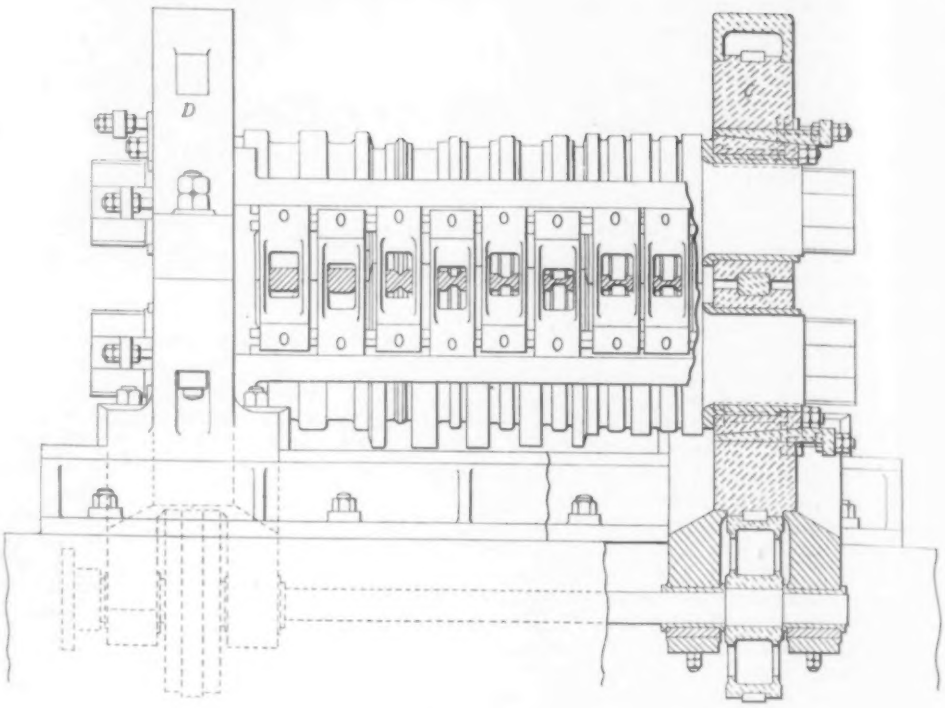



Fig. 3—Elevation of Rolls Showing Method of Rotating Gables

Under such conditions as these the output capacity of mills cannot possibly be even approximately reached, and the cost of production is thereby chronically excessive, and reacts upon and checks demand; and so it would appear that our steel makers seem to be within a vicious circle, where limited demand results in high cost of production, and where high cost of production again causes limited demand; and this is a situation sufficiently serious to claim the earnest attention of all those directly interested. Not much comfort or satisfaction is to be got from those who will tell us that this is clearly a case of the survival of the fittest and the withdrawal of the vanquished from the field. Is there, however, no remedy at all for such a state of matters?

Remedies have been proposed, to which the author dares not allude in this place, but there is one which is so safely outside the pale of politics that no apology is necessary in referring to it—this is specialization.

We are all familiar with the saying, "It is a wise farmer who looks over his neighbor's fence," and those of us who have visited America and Germany and seen the steel works in these countries, could not fail to have been impressed with the constant endeavor put forth to carry out this principle of specialization to the fullest extent in all their operations; and this for the sole purpose of enabling them to produce cheaply, and consequently to keep their plant running to its fullest capacity, in the knowledge that the more they produce the cheaper they produce.

Hence we see continuous billet rolling mills working all the time on billets alone, and producing these in quantity far above, and at a cost far below, what can be done in this country. The same principle is carried through in

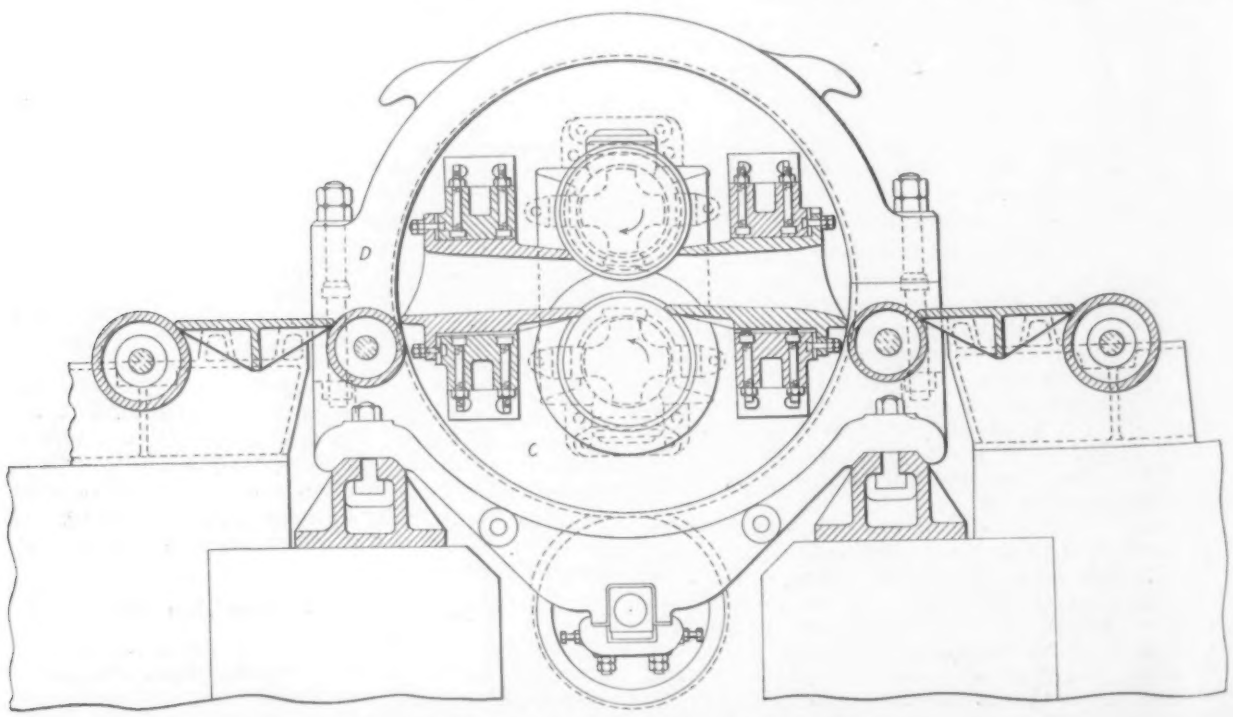



Fig. 4—The Mechanism in Fig. 2 Shown on a Large Scale

all their rolling operations, the orders received at headquarters being carefully classified and sent to the mills specially designed for producing the sections required, and large economies being thereby effected. In Germany, the Verband, controlling a number of the largest works, carries out this same method, and years of experience have now proved the great value of the system.

At the present time the steel works all over the world are practically full of work, so that the British steel maker is not seriously affected by American and German competition, but the inevitable ebb in the tide of prosperity is sure to set in, and then the struggle for our share of the business of the world will certainly be keener than we have ever yet experienced. To meet this our steel makers will have a very serious and difficult problem to face as the conditions in this country are admittedy widely different to those in America and Germany.

In whatever way the matter may be dealt with, the value of this system of specialization in design of mills, and classification and selection in the work rolled in these mills, which have proved beyond doubt so beneficial wherever they have been systematically followed, cannot be ignored, and every improvement that can be devised, tending to increase the efficiency and simplicity in operation of such mill plants, must constantly engage the attention of the engineer, if we are to hold our own against the very formidable opponents who so strenuously assail our position, and who enjoy advantages in regard to our markets here which are unfortunately denied to us by them.

Should the new methods described in this short paper prove in some degree instrumental in attaining higher economy in rolling-mill practice, or be assistant to others who may be working on this important problem, the author will feel amply compensated for any little trouble he has undertaken in this modest effort toward improvement on existing methods.

## Standard Method for Sampling Ferrovanadium

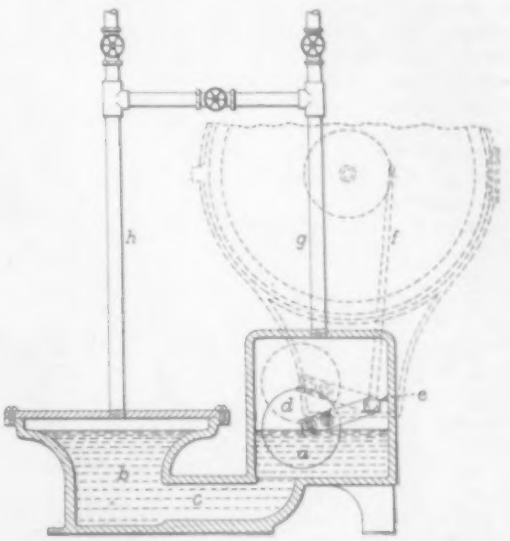
Considerable misconception prevails among steel chemists and metallurgists as to the proper way to sample ferrovanadium for analysis, and the importance is not always recognized. The average chemist generally selects one or two pieces from a keg or lot and considers this sample a good reliable one. William M. Clark, of the American Vanadium Company, in Metallurgical and Chemical Engineering has offered a standard method which is about as follows:

Commercial ferrovanadium, like every other complex alloy, on cooling goes through a solidifying interval and not a sharp solidifying point. The result is a segregation of the constituents. Besides this, ferrovanadium is manufactured in small quantities in crucibles, which will naturally vary in composition from crucible to crucible to some extent, rendering careful sampling of a large lot very necessary. The method recommended is one which has been adopted after numerous experiments and has been found to give uniform results on checking. The alloy is shipped in several different sizes, from lumps 6 in. in diameter down to 10 mesh, according to requirements. In sampling the lumps a couple of chips are knocked off each lump with a chipping hammer. The regular size, which is crushed to lumps about the size of a walnut, is sampled during the process of kegging by running the hand along the front edge of each shovelful of the alloy, which has been well mixed after crushing, and taking off all that can be held in one hand of both fine and coarse material. The finest grades of alloy are sampled by mixing and quartering until a sample of the requisite size is obtained. A sample of at least 3 per cent. of the bulk of the alloy should always be taken; however, when the alloy is very coarse this should be increased considerably.

The samples are first put down to rice size in a small crusher, the jaws of which are hardened steel. This crushed sample is quartered twice and then put down to 20 mesh. This is quartered until about 2 oz. remain, which is all powdered in a hardened steel mortar until it will pass through a 100-mesh sieve. This sample is well mixed for use in the laboratory. Ferrovanadium is not uniformly magnetic, so that if a magnetic spatula is used in weighing weird results are the rule.

## Float Type Differential Pressure Gauge

In addition to the spring pressure tube design of recording differential pressure gauge which was illustrated in *The Iron Age*, April 17, 1913, the Bristol Company, Waterbury, Conn., is placing on the market a float type gauge. This gauge was developed to meet requirements for which the spring pressure type is not suitable, such as very low ranges of differential pressure in air, gases, liquids or steam, for application where the static and differential pressures fluctuate rapidly and to give an instrument which would record the rate of flow or volume




Section of a New Float Type Recording Differential Pressure Gauge Showing the Arrangement of the Operating Mechanism

directly upon the chart graduated uniformly in units of flow or volume.

There are two pressure chambers *a* and *b* which communicate with each other through the connection *c*. A cylindrical float, *d*, is located in the pressure chamber *a* and is connected by arms to the shaft *e* which extends through the casing of the chamber. The recording arm *f* is connected directly to the end of this shaft. Connections are made by the pipes *g* and *h* between the two pressure chambers and the two pressures, the difference of which it is required to record. Either mercury or water is employed in the pressure chambers, depending upon whether the differential range to be recorded is high or low. When the higher pressure is applied to the chamber *b* through the pipe *h*, the level of the liquid in this chamber is lowered, and that in the float chamber is correspondingly raised, carrying the float and the attached recorder arm with it and making a record on a circular chart, which is revolved by a special clock at the desired speed. By making the cross-sections of the pressure chamber *b* of certain known proportions, it is possible to produce a scale whose graduations are uniform for equal increments of flow or volume.

As these gauges will operate on very low differential ranges, it is pointed out that they are well adapted for use in connection with Pitot tubes for recording volumes of liquid, air or gases, and one of these gauges has been used in connection with the Pitot tube at one of the largest blast furnaces in the United States, to give a 24-hr. record of the flow of blast furnace gas. In this particular case, the actual differential pressure for the total range of the chart, which ranged from 0 to 500,000 cu. ft. per hr., was 0 to 1.46 in. hydraulic head.

If desired, the instrument may also be used to record the head of water in tanks under varying pressures, as, for example, the water level in steam boilers and condensers and also for recording the flow of water through a notch or over a weir, even though the liquid in this case may be under pressure or in a vacuum.

The Wickwire Steel Company, Buffalo, N. Y., blew out its No. 2 furnace this week for a quick relining. It will probably be blown in again earlier next month.

## Machinery Exhibits at the San Francisco Exposition

Rapid progress is being made in the construction of the main exhibit buildings at the Panama-Pacific International Exposition at San Francisco. The first of the buildings is now completed and five other structures are under way. There will be 14 main exhibit buildings in all, and contracts will be let upon the remainder to bring all to completion by July, 1914. Work on Machinery Hall, the largest of the exhibit group, was begun early in the year, and the framing of the main portion of the structure is partly completed. This will permit the complete installation of exhibits by the opening date, February 20, 1915. The exposition management plans a record not only in construction but in the presentation of a finished spectacle on the opening day.

The department of machinery exhibits is thoroughly organized, and filings for exhibit space have been received to an extent that assures a display commensurate with the importance of the industry. Early applications are especially welcomed by the Panama-Pacific management and will facilitate the proper grouping of the exhibits and the perfection of other arrangements essential to the interests of exhibitors as well as to the exposition.

For the information of exhibitors the following brief data have been supplied by the exposition company:

Machinery Hall will be the largest building at the exposition. The structure will be 367.8 x 967.8 ft. and will be decorated with more than a mile and a half of ornamental cornices. The architectural design of the building is based upon the Roman arch motif, prototypes of which may be found in the big Roman baths at Hadrian and Caracalla. The interior arrangement consists of three naves, each 75 ft. in width, 122 ft. in hight and more than 900 ft. long. The building will have nearly eight acres of floor space. In addition there will be an auxiliary structure to be known as the Gas and Fuels Building. Electrical machinery, instead of being placed in a separate building, will be located in Machinery Hall.

All parts of the building will be served by adequate crane facilities. Electric current, alternating and direct, gas and water, will be available in any portion of the building; compressed air and steam will be provided in a section adjacent to the Gas and Fuels Building. General illumination is to be provided by the exposition company, but a nominal charge will be made to exhibitors for other utilities service they desire. Special rates for power will be made to exhibitors who use it to show machinery in motion. The floor of Machinery Hall is designed for a load of 200 lb. per sq. ft. The soil conditions will permit adequate foundations for heavy machinery to be readily constructed. No charge will be made for exhibit space.

Copies of the rules and regulations, documents as to the classification of exhibits, blank applications for space, and other information prepared for the guidance of exhibitors, will be promptly forwarded on request to the Panama-Pacific International Exposition Company, San Francisco, Cal.

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At the limestone quarries at Franklin Furnace, N. J., operated by B. Nicoll & Co., New York, wages were advanced this week from $1.50 to $1.60 a day.

## Large Automobile Side Frame Press

### A Moving Table Capable of Handling Steel ¼ in. Thick and 18 Ft. Long

A new design of press for forming automobile side frames, which is claimed to be the largest machine of its kind yet built, has recently been developed by the E. W. Bliss Company, 11 Adams street, Brooklyn, N. Y. A special feature of the machine is a moving table that is raised by four solid connecting rods. Fig. 1 is a front view of the press, and the driving gears, which are made of steel castings, and lubricating arrangements are shown in the rear view, reproduced in Fig. 2.

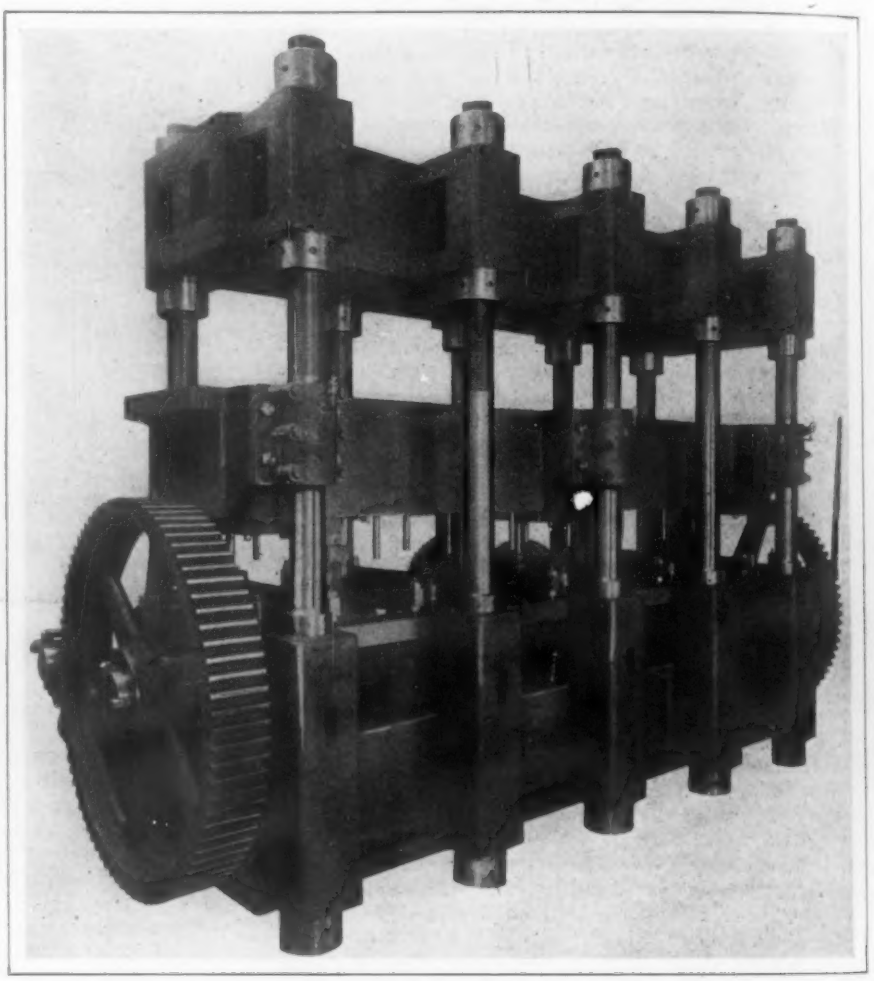

Fig. 1—Front View of a Recently Completed Large Press for Forming Automobile Side Frames

It will be noticed that the moving table, which is 18 ft. long and 3 ft. wide, is raised by four solid connecting rods that are fitted to the crankshaft, the rods being located at equal intervals throughout the length of the machine. Adjustment for varying the depth of the drawing operation is provided by the nuts holding the upper head, which has an adjustment of 22 in. The distance between the moving table in its raised position and the bottom of the upper head when raised to its uppermost position is 32 in.

The machine is twin driven, a gear being located on each end of the crankshaft. The main driving gear, which imparts power to the gears at the end of the crankshaft, is placed centrally on the main back shaft and transmits its power through triple reduction gearing. Steel castings are used for the gearing, and the teeth are machine cut from the solid blank. A hand-operated double grip friction clutch controls the machine, so that the operator has complete regulation of the moving parts at any point of the upward or downward movement. Shearing pins are provided for the driving pulley and the flywheel, which operate to prevent injury if through carelessness some foreign article, such as a wrench, bar, etc., is left on the top of the die, or when the pin is not adjusted properly with reference to the closed hight of the dies.

Provision is made for ejecting the formed work from the sunk die on the lower table by knockout bars mounted

on the inside, and a series of holes in the moving table permits the knockout pins to be placed in the proper position to eject the work. Lubrication of the connecting rods operating the moving table is supplied by a high-pressure oil pump, mounted on the back of the moving table, which, together with the upper head, is made of steel castings.

The machine is capable of forming side frames of ¼-in. chrome nickel steel up to a maximum length of 18 ft. and weighs 300,000 lb. When operating at its maximum capacity the power required is 75 hp.

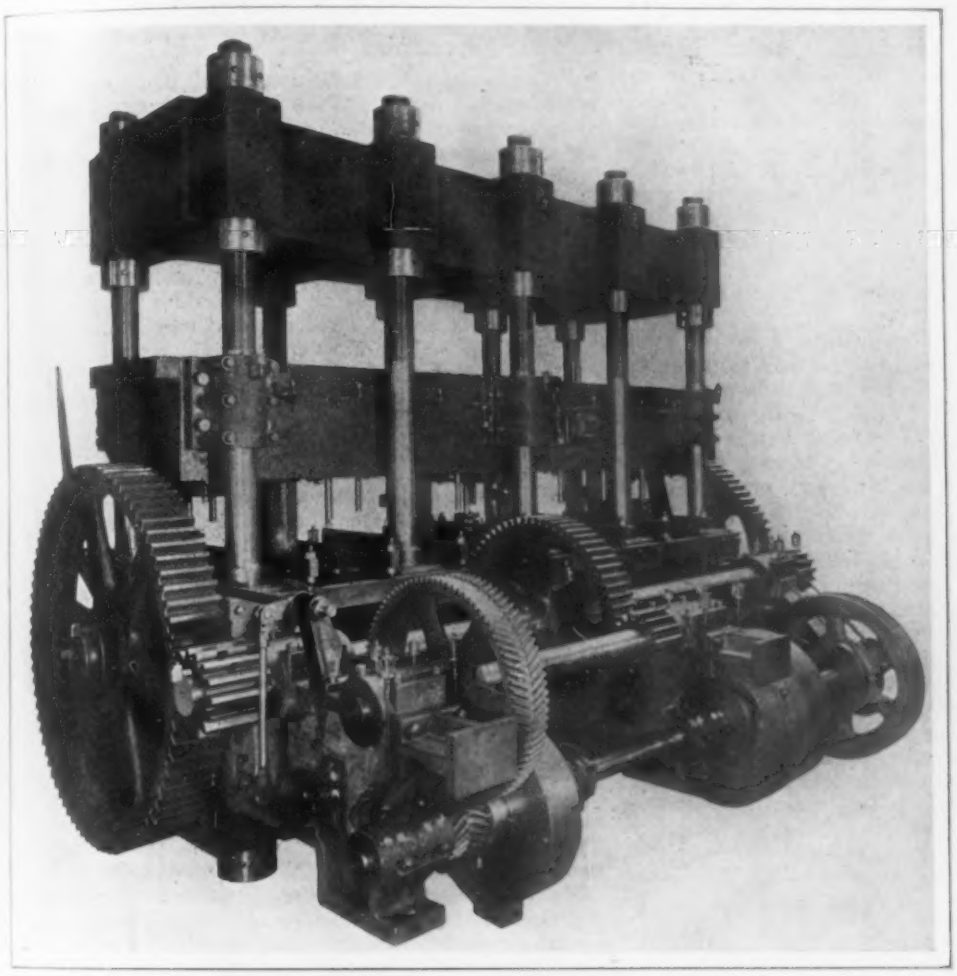

Fig. 2—Rear View of the Press Showing the Driving Gears and Lubricating Arrangements

## Recovering Submerged Motor Control Equipment

At the time of the recent disastrous flood in Ohio there were 15 multi-voltage calendar controllers, three alternating-current motor control panels, two 500-hp. multiple switch motor starters and many miscellaneous types of Cutler-Hammer controllers in the plant of the Goodyear Tire & Rubber Company, Akron. All this equipment was completely submerged for a considerable period. Water and mud, the latter, particularly, had gotten into every crevice, some of the drum controllers being found filled with mud. When the engineers and erecting men sent by the Cutler-Hammer Company arrived at the plant the work of scraping out the mud had been started, and some of the controllers were placed in small sheds erected by the Goodyear Company which were used for drying purposes, being lined with steam pipes.

On testing the calendar panels there was apparently a considerable ground, but this proved to be due to the moisture in the grid resistance insulation, which was quickly dried out with blow torches, and the panels were in condition for use as soon as the calendars were ready to be driven. The Varley coils, with the exception of three which were damaged in the handling, were entirely unaffected by the long submersion in water. The cement-covered resistance units also, with the exception of two broken in conveying to dry rooms, were not affected by the water. The entire equipment was put back in operation as soon as the machinery of the plant was ready and no trouble was experienced.

## Crucible Steel Melting Record

W. J. Mathews, melter, in charge of the two 30-pot crucible furnaces at the works of the Columbia Tool Steel Company, Chicago Heights, Ill., has again broken the record for a continuous run on the No. 2 furnace. This furnace made its first heat July 13, 1909, and made its six heats a day regularly, except Sundays and holidays, up to April 24, 1913, a period of three years, nine months and eleven days. During this time it melted 6290 heats, or 9435 tons, of fine tool steel. The furnace is not in bad condition even now. Several new tops have been put on the furnace on account of the wear dragging the pots over the top layer of bricks, and on January 18, 1913, a new middle wall was put in. Otherwise, there have been no repairs. When this type of furnace was first used in this country a run of four or five weeks was considered satisfactory, and when a furnace was made to run four or five months it was regarded as exceptional. Everything depends on the skill of the melter, however; the furnace can be burned down in 24 hours unless good judgment is used.

The furnaces at Chicago Heights are constructed a little differently from the crucible furnaces in the Pittsburgh district. On account of the rivers at Pittsburgh rising every spring, and the possiblity of water getting into the furnaces, they have generally been built high and mostly above ground. The Chicago Heights furnaces are down in the ground so deep that the melting floor is only 31 in. above the floor level. This, without doubt, keeps the heat of the furnace more uniform throughout the mass, and there is little or no expansion and contraction from exterior cooling. It is a policy of the Columbia Company to have underground work done in the best manner possible, regardless of expense; consequently, when these furnaces were put in, notwithstanding the fact that the soil is a hard, dry block clay, 12 in. of concrete was first laid and bonded together. On top of this the furnace was built, making it impossible for the structure to settle in the slightest degree. The partition walls between the gas and air tunnels are generally built 12 in., but in this furnace they were made 18 in. thick, which prevents the furnace from leaking and also holds it more rigidly. The quality of fire brick should also receive its share of credit. It is really a remarkable thing for any fire brick to stand a continuous heat of about 3000 deg. for this length of time.

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Owing to the rapid increase in the demand for Foster superheaters, the Power Specialty Company, 111 Broadway, New York, is building a new erecting shop 96 x 300 ft. Recent contracts received for Foster superheaters total 77,300 hp., among which are the J. I. Case Threshing Machine Company, Racine, Wis., 2000 hp., for installation in Wickes boilers; Jones & Laughlin Steel Company, Pittsburgh, 3528 hp., for installation in Rust boilers; Brier Hill Steel Company, Youngstown, Ohio, 6000 hp., for installation in Erie City boilers.

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# Bureau of Corporations on Steel Corporation

## Third Part of Bureau's Investigation, Treating of Costs and Profits of Various Iron and Steel Products

The Bureau of Corporations has submitted to the President the third part of its report on the United States Steel Corporation and it will be transmitted by the President to Congress. The report says that the statements of cost of production, as shown by the cost sheets of iron and steel manufacturing companies, ordinarily include important items of profit accruing to the same manufacturing interests, and "this arises from the fact that the ore and coke used in making pig iron are largely produced by allied or subsidiary companies, which sell such materials to the manufacturing plants operated by the same interests at prices which ordinarily include a profit, and in the case of ore a very large profit."

Concerning profits from sale and transportation of ore, the report says:

"Thus, for the Steel Corporation in 1910, the intercompany profit on iron ore was no less than $1.30 per ton out of an average ore price per ton of $4.18 in which there was, in addition to the profit of $1.30, a further considerable transportation cost and profit. Owing to the fact that about 2 tons of ore were required to make a ton of pig iron, this profit per ton in ore involves a profit of about $2.48 per ton in the cost of pig iron on this account alone. For similar reasons, larger amounts of profit per ton are included in the costs of steel products. Hence, in order to obtain the net cost of manufacture for such concerns, it is necessary to eliminate these intercompany profits from the book costs, or costs shown on the cost sheets.

"Furthermore, some manufacturing concerns, and particularly the Steel Corporation, have subsidiary companies engaged in the transportation of raw materials for manufacture. The cost of transportation, however, included in the book cost of these materials, are based on the regular or going rates of transportation charged by the transportation agencies, and include large amounts of intercompany transportation profit. Thus, the profit of the Steel Corporation from the transportation of its own ore in 1910, averaged over all its ore delivered at lower Lake ports, was about $0.57 per ton. This profit mounts up to over $1.09 per ton of pig iron."

The report continues:

### Net Costs of Pig Iron and Bessemer Rails

The bureau, therefore, in its statements of costs of various products, gives not only the book costs, or costs shown by the cost sheets of manufacturing companies, but also the net costs excluding such intermediate profits of production and transportation. Thus, from certain average costs of all companies which are presented, the intercompany profits from the production of raw materials are excluded, while from the costs of the Steel Corporation the intermediate profits from both production and transportation are eliminated.

The importance of such eliminations of intercompany profit are apparent from the following comparisons: Taking again, for illustration, the costs of the Steel Corporation, it appears directly from the records of that company that the average book cost of Bessemer pig iron in 1910 was $14.39 per ton (including an assumed normal addition to furnace cost of $0.50 per ton for general expense and depreciation), while the net cost, excluding intercompany profits on materials and transportation, was only $10.21. The intercompany profit deducted from the book costs, therefore, was no less than $4.18 per ton. If, however, only the intercompany profit on materials is excluded, the bureau computes the net costs as $11.21 per ton, as compared with the book costs of $14.39. The margin of profit over cost should, of course, be related to a different investment in each case.

Similarly, for Bessemer steel rails, the average book cost of the Steel Corporation in 1910 was $21.53 per ton (including an assumed normal addition to mill cost of $1.30 for general expense and depreciation), while the net cost, excluding intercompany profit on materials and transportation, was only $16.67. Deducting only intercompany profits from materials, the bureau computes the net cost at $17.82 per ton.

### Profit on Ore Investment

The necessity of determining the net costs is clear when consideration is given to the very high profits charged on iron ore and on the transportation of iron ore.

On the basis of the bureau's estimate of the average cost of ore property at the time of the formation of the Steel Corporation, together with due allowance for subsequent investments of the Steel Corporation therein, the average investment of the Steel Corporation in Lake ore was about $4.47 per ton of ore produced in 1910. This investment is computed on the basis of a 30-year supply in reserves of ore, all additional investment in ore reserves being excluded from consideration. The profit of $1.30 per ton which was charged by the Steel Corporation in 1910 was equivalent, therefore, to a rate of 29 per cent. on the computed investment in ore. Considering that the Steel Corporation owns or controls the great bulk of the Lake ore supply; that in consequence of the number of its mines, its risk of operating them is reduced to a minimum; that it has an assured market for the sale of its ore to its own manufacturing plants; and that its production of iron and steel is so extensive and diversified, and so widely sold throughout the world, that a very large output is always practicable, it is evident that the risk of this business is comparatively small, and that the profit is excessively high.

### Profits of Ore Railroads

Similar conditions are found with regard to the profits from the transportation of ore. This appears at once when the extremely low ratios of operating expense to gross earnings of the Steel Corporation's two railroads in the Lake ore mining district in 1910 are stated, namely, 30 per cent. for the Duluth, Missabe & Northern Railway, and 36.5 per cent. for the Duluth & Iron Range Railroad. The average ratio for all the railroads of the country in 1910 was 66 per cent. The business of these two railroads is almost entirely in the carriage of ore, and, for the most part, there is no existing or potential competition therein.

The situation of these railroads as respects investment and profit from operations is such that the rate of profit from the ore traffic on the investment fairly attributable to the ore transportation business may be safely taken as not less than the rate of the total profit on the total investment. Moreover, in computing the total net earnings these railroads admittedly made a little more than a necessary provision in 1910 for depreciation of the property on account of the ultimate exhaustion of the ore deposits from which their traffic is chiefly derived.

On the basis of the total investment (including net working capital), and the total net earnings reported by these two railroads, the rates of profit in 1910 were, for the Duluth, Missabe & Northern Railway, about 23 per cent., and for the Duluth & Iron Range Railroad, about 17½ per cent. Such high rates of profit from a business which is monopolistic in character, and also affected by a public use (common carrier), are obviously excessive. It should be noted, however, that the extraordinarily high transportation rates on ore from which these profits were derived were considerably reduced by the Steel Corporation in 1911, shortly after the publication of the first part of the bureau's report on the steel industry.

### Relation of Investment to Net Costs

It is evident, therefore, that in order to compare costs with prices for the purpose of determining whether the margin of profit is reasonable or unreasonable, it is necessary to obtain the net costs of production, excluding these intercompany profits from materials and transportation. On the other hand, it is equally evident that, when such net costs are used in determining the margin of profit, due

account must be taken of the total investment employed, i.e., not only in the immediate manufacturing processes for which costs are stated, respectively, but also for the anterior processes of manufacture, production, and transportation, in so far as they are related to the cost of the product in question.

Thus, if the net cost of Bessemer rails of the Steel Corporation in 1910, namely, $16.67 per ton, is compared with the average selling price, namely, $27.45, the profit margin of $10.78 resulting therefrom must be compared with the investment, not only in rail mills, but also in the steel works, blast furnaces, ore and coal mines, coke ovens, and transportation facilities which were required to produce rails at such a low cost.

Such a computation is, from the nature of the case, exceedingly complex, and, however carefully made, the results obtained must be regarded as approximate. In making such calculations, the bureau has been careful not to underestimate the investment made, and consequently it is believed that the computed rates of profit are not overstated.

### Profits on Investment for Rails and Plates

Some illustrations of the rates of profit on investment are as follows: For Bessemer steel rails the net cost of the Steel Corporation in 1910 was $16.67 per ton, including certain estimated additional costs, as stated above; the average selling price was $27.45, giving a profit margin of $10.78. The investment in raw materials, transportation facilities, manufacturing plants, and net working capital required for the production of rails was about $65 per ton of profit, according to the computations of the bureau. This indicates a rate of profit on investment of 16½ per cent. on rails.

On a similar basis, the bureau's computations indicate for plates a rate of profit in 1910 of 10½ per cent. on the investment. These different rates of profit illustrate furthermore certain differences in price-making conditions, which were somewhat competitive for plates in 1910, while notoriously noncompetitive for rails.

### Periods Covered by Cost Statements

The chief statements of cost comprised in the full report include, first, average costs of a great variety of iron and steel products for nearly all the manufacturing companies for the five-year period 1902 to 1906, and second, the costs of the Steel Corporation in 1910 for a considerable number of such products. Owing to the elaborate character of the first statement and the great labor involved in making it up, it was impracticable to bring it down to a recent date. Nevertheless, by means of comparisons of average costs of production of raw materials for a large part of the total industry, and of typical plant costs for the manufacturing processes themselves (costs above material), it is made clear that there has been very little variation in the costs of heavy steel products in recent years as compared with 1902 to 1906.

### Cost Variations by Localities and Plants

For the period 1902 to 1906 the average costs are shown for certain products by districts. This comparison shows, for example, a decided advantage in the cost of assembling materials for the plants located on the shores of Lake Erie, as compared with those located in the Pittsburgh district, under the prevailing railroad rates on ore from Lake Erie ports to Pittsburgh.

For these same cost statements, comparisons are also made between the net costs (but without deduction of transportation profits) of large companies and small companies, which indicate a decided advantage in favor of the former. Thus, for Bessemer pig iron the net cost (including an assumed normal addition to furnace cost of $0.50) averaged $11.61 per ton for the large companies and $14.62 for the small companies. This difference was due in part to the more complete integration of the large companies.

Again, for the costs of the Steel Corporation in 1910, the variations in costs for certain products are shown for individual plants (without disclosing their identity) which makes clear the wide variation in individual plant costs. Thus, for the net costs of the Steel Corporation in 1910, the cost of Bessemer pig iron ranged from $9.20 to $13.47 per ton (including an assumed normal addition to furnace cost of $0.50 as before). These data are also combined in various groups, namely, by districts, by ranges in cost, and by volume of production. These comparisons tend to show the variations in efficiency according to districts and to other particular circumstances, and to indicate some of the causes of such variations.

The facts presented in this report, therefore, are obviously of great value with regard to various large questions of public policy and national welfare, such as reasonableness of prices, industrial efficiency, ownership and control of natural resources, relations of common carriers to manufacturing enterprises, and tariff legislation.

## Interstate Commerce Complaints

### Increase in Ore Dock Charges

The Hayes Mining Company, Ironwood, Mich., has filed with the Interstate Commerce Commission a complaint against an increase in the freight rate on iron ore from its mine at Ironwood to Ashland, Wis., and handling there. For a number of years the rate has been 40c. per gross ton, but on January 2 the charge for the freight service and handling at the dock was increased to 45c. per ton, and a charge of ¼c. per ton per day for storage after the first 10 days was provided for. It is charged that this rate is unjust and unreasonable, in that the complainant's mine is located slightly over 40 miles from the harbor while other mines situated 60 miles away receive the same rate. No ore has been shipped under the new rates as yet, it is stated, and the commission is informed that the complainant will later amend its petition so as to permit it to apply for reparation in the event that the commission decides that the rate complained of is unreasonable and which will soon be collected on shipments, as the case could not be reached before the present shipping season opened.

### Rates on Iron and Steel Window Sash and Frames

By order entered May 9, the commission suspended from May 11 until December 8, 1913, certain items in two railroad tariffs filed. The suspended items contain exceptions to the Western Classification and affect the ratings on iron and steel window sash (glazed), carloads, and iron and steel window frames when shipped with sash from interstate points to points in Texas, Louisiana, and Mexico. Under the present provisions glazed sash are rated fifth class and may be shipped at that rating in carloads mixed with window frames. The proposed provisions rate sash at fourth class and frames at fifth class ratings, carloads and will not permit of mixing at the lower rating. For illustration, the fourth class rate from Kansas City, Mo., to Dallas, Tex., is 89c. per 100 lb. and the fifth class rate between the same points is 70c. per 100 lb.

## Wrought-Iron Castings

The Hess Steel Castings Company, Witherspoon Building, Philadelphia, Pa., claims that the ideal metal for case-hardening boxes, pots for lead, cyanide and salt hardening baths, containers for molten zinc and die casting metals, etc., is wrought iron. Of all the base metals, wrought iron has the greatest ability to withstand high temperatures and frequent heating and cooling combined with less deterioration by warping, scaling and cracking.

To successfully cast wrought iron, however, constitutes a foundry task beset by many difficulties, but the company has developed the practice of producing such castings and makes a specialty of the articles cited above. Other products it makes are wrought-iron castings of great magnetic permeability for electro-magnetic apparatus. It gives careful attention to the needs of quantity users of castings of wrought iron alloyed with carbon, manganese, etc., to impart special strength, uniformity and other desired qualities.

The Orenstein-Arthur Koppel Company, Koppel, Pa., furnishes a brief account of the construction of the Commonwealth pier of the Hamburg-American Line at Boston, in which a large quantity of concrete was used. The contractors were H. P. Convers & Co., who adopted the Koppel system for conveying the material, comprising V-shape dump cars and portable track. With this system one man was found capable of pushing a car loaded with 18 cu. ft. of concrete from the mixer to the point of deposit. The portable track enabled the operator to deliver the car wherever desired.

## Turbo Blowers at Youngstown

The Youngstown Sheet & Tube Company, Youngstown, Ohio, is installing a turbo blower to furnish the blast for its D stack, now under construction and expected to be in operation in the near future. This turbo blower, which is being built by the Southwark Foundry & Machine Company, Philadelphia, will be the first machine of the kind to be used in the Pittsburgh or Valley districts and only a few plants are using this class of blowing equipment elsewhere. It is of the multi-stage Rateau type, direct connected to a multi-stage impulse high pressure condensing turbine, and is capable of delivering 40,000 cu. ft. of free air per minute, against a maximum pressure of 30 lb. per square inch. The blower is provided with a Rateau multiple venturi regulator which controls the delivery for a constant volume, irrespective of the pressure required.

The Youngstown Company has had in operation in its Bessemer department a turbo blower of the same type, also built by the Southwark Company, which is giving efficient service. This differs from the blast furnace blower in having a governor designed to regulate for constant pressure irrespective of the volume required. This is essential on the Bessemer turbo blower where either one or both converters may be blown at will. With the turbo blower it is not necessary to stop the machine when neither converter is being blown, the governing device automatically taking care of this condition. The impressive fact concerning the installation in the Bessemer blowing house of the Youngstown Company is the large amount of space saved by the turbo blower over that occupied by the cross compound reciprocating blowing engine formerly used for the same work. The company is the first to install a rotary blower operating on Bessemer converters, and states that the machine and its operation have proved most successful, eliminating the pulsations produced by the ordinary reciprocating engine.

## The German Cranes for Panama

Considerable interest has been aroused in this country over the award of our government to the Deutscher Maschinenfabrik A. G., for the two large floating cranes for the Panama Canal. This firm is known to the trade as Demag, Ltd., Duisburg, Germany, and is represented in this country by Neumeyer & Dimond, 82 Beaver street, New York. It has a reputation for massive cranes of different styles, having had an experience of over 25 years. The illustration exhibits the general appearance of these cranes as they will appear at Panama, though they will differ in some details.

Type of German Crane for Panama Canal

Each crane is carried by a pontoon 88 x 150 ft. and 16 ft. deep, drawing 8 ft. of water. The construction of the hull is of water-tight compartments, forming the so-called double bottom to avoid sinking in case of accident. The position of the crane on the pontoons is such that it is exactly in the center, an equal distance from both sides and each end.

The central portion of the crane consists of a pyramidal structure, reaching nearly to the top of the main portion carrying the jib; on this structure rests a large bearing about 6 ft. in diameter, equipped with conical rollers. This bearing takes the entire weight and strain of the crane with its load. The main portion of the crane carrying the jib surrounds the central structure and has a base of about 25 ft. square, which runs on wheels on a circular track to offset any tipping tendency. The jib is movable, working through an angle of about 80 deg., and is 205 ft. above the water at its highest position. It is equipped with three hooks, two of 125 tons capacity each and with one of 15 tons, connected to a moving trolley, which can travel the whole length of the jib, or about 130 ft. The two 125-ton hooks can be operated separately or jointly by uniting them with a combination hook, thus lifting the maximum load of 250 tons of 2240 lb. Each crane is, however, tested to 300 tons and is capable of manipulating this load if necessary. The lifting capacity is 250 tons when the jibs have a radius or outreach of 22 ft.; 150 tons at a radius of 62 ft. and 100 tons at a radius of 82 ft., the lowest position. An operating house 60 ft. above the surface of the water is located in the front part of the crane about on a level with the bearing and is equipped with a search light for night operation. From this house the whole crane can be manipulated by a single operator.

The entire mechanism is, of course, electrically operated, with the Leonard system of control. Special precautions are being taken as to insulation of wires and conductors because of the climate of Panama and no wood will be used in the construction for the same reason. On each pontoon is a complete power plant, consisting of a Scotch boiler carrying 170 lb. of steam and an engine of the marine type direct connected to a 160-kw. direct-current generator, 120 volts being employed.

The total cost of the two cranes is $837,000 and the schedule calls for their delivery in November, 1914.

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The Sullivan Machinery Company, whose headquarters are in the Peoples Gas Building, Chicago, has removed its Montreal office to room 806 Shaughnessy Building, corner St. Paul and McGill streets.

# A New Mill Pipe Threading Machine

### One of a Recently Developed Line Designed for Use in Pipe Plants

A new pipe threading machine designed especially for pipemill work has been brought out by the Pipe Machinery Company, 4907 Mead avenue, Cleveland, Ohio. One of the features of the machine is the complete inclosure of its gripping device and the guarding of the gears, thus leaving little mechanism open for the accumulation of dirt and grease and reducing to a minimum the chances of injury to the operator. The machine illustrated has a capacity for pipe ranging from ⅜ to 2 in. in diameter, but it will be built in a number of sizes for handling pipe from ⅛ to 12 in. A view of the machine is given in Fig. 1, while details of the gripping mechanism are shown in Fig. 2.

The bed of the machine is of the same type as that used for bolt cutting machines with sufficient weight and strength to insure rigidity. An oil reservoir is formed by the column of the bed, and a trough around the bed to catch the splashings from the threading dies forms an integral part of the bed casting. The hollow spindle or barrel through which the pipe passes to the die head rests on a headstock that is a part of the bed casting. The hole through the spindle is 3¼ in. in diameter, and the jaws of the inclosed chuck for gripping the pipe are so arranged that they move at right angles to the pipe. The chuck jaws are operated by a hand lever through a toggle movement. A feature of the machine is the shortness of the barrel, the length being slightly more than a half that of most of the machines now on the market.

The carriage is operated by a lever instead of a rack and pinion, and has a travel of 14 in. The carriage head is made of cast steel, and the carriage is arranged for cutting-off and reaming as well as for threading. The machine is designed so that it can be used with a special automatic die operaing device, and in this case the operator stands at the rear of the machine with the levers in convenient reach. The dies are of the type ordinarily used in mill type pipe threading machines. Both the carriage and the slides upon which it travels have renewable wearing strips.

The machine is driven by a 3½-hp. adjustable-speed motor, resting on a bed that is bolted to the main bed. The machine, however, is so designed that it can be operated either by a single-belt drive or a constant-speed motor. When the latter type of motor is used a different gear box is substituted, so that the required speed changes can be secured. All of the gears in both drives are of cut steel with the exception of the motor pinion, which is rawhide. Gear guards, which were not placed on the

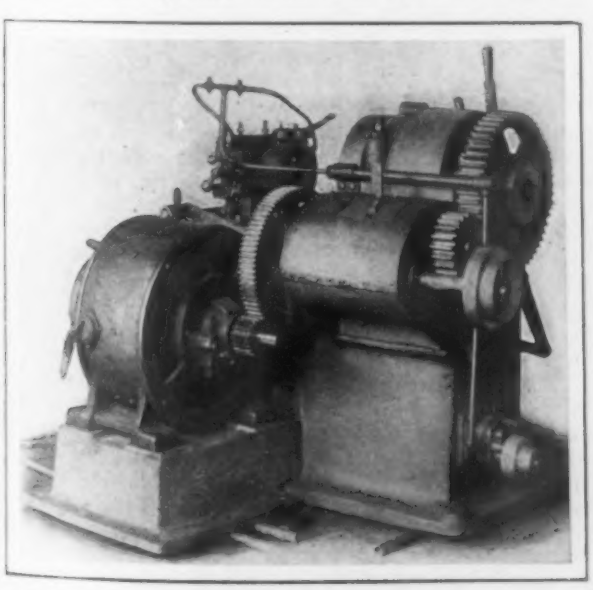


Fig. 1—A Recently Developed Pipe Threading Machine Designed Especially for Pipe Mill Work

machine when the photographs were taken, cover all the gears. This arrangement provides a speed range of 8 to 1, a 4 to 1 ratio being obtained through the motor and the remainder by sliding gears.

For furnishing a supply of oil to the threading dies and cutting-off tool an oil pump is provided which is driven from one of the driving shafts by a belt on two-step cone pulleys. A screen, which separates the oil from

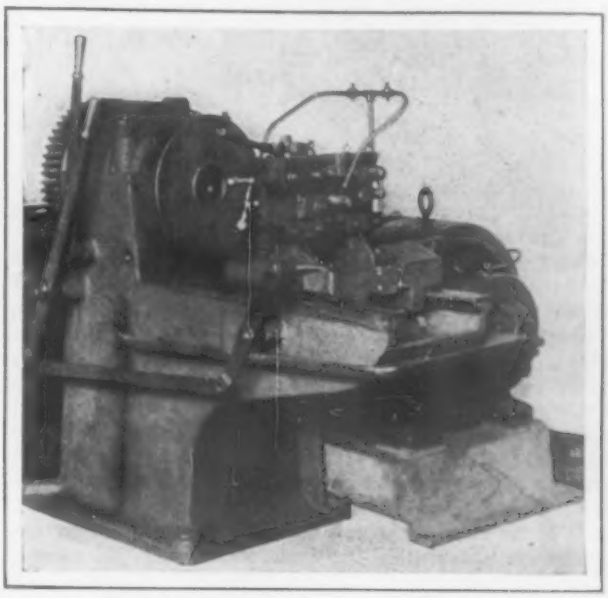


Fig. 2—View of the Machine Showing the Gripping Mechanism

the cuttings, is arranged so that the chips instead of falling directly upon the screen fall on a shelf from which the oil drains off through the screen. In this way it is pointed out that the minimum amount of small chips will get into the oil.

The floor space occupied by the machine, including the motor, is 4 x 6 ft. and the weight is approximately 3000 lb. The company is also planning to bring out a pipe threading machine for jobbing shops which will differ in some respects from the one illustrated. The principal points of difference between the two machines will be that the carriage of the jobbing machine is to be operated by either a lever or a rack and pinion, and the rear end of the barrel will have a centering chuck. It will also have adjustable dies and a nipple cutting attachment, and will be furnished with either direct-connected motor drive or a belt drive.

## New Zealand Coal and Iron Ore

P. G. Morgan, director of the Geological Survey, gives some interesting but rather discouraging facts in his evidence before the Empire Trade Royal Commission regarding the mineral deposits of New Zealand. The chief iron ore beds are those at Parapara and Taranaki. An examination of the former showed about 22,700,000 tons of iron ore. It is said there is an equal quantity in an adjacent block. The Taranaki iron sand makes iron of good quality, but there would be difficulty in transporting it to the smelting works, it being scattered over a great length of coast line. It also contains titanium. The whole quantity of coal in the country is about 3,385,000,000 tons, only about one-fourth of which can be mined. Mr. Morgan said he could not bear out the glowing statements of some as to the iron and coal resources of the country and that New Zealand would never produce much coal or iron.

The Welding Company, which is an abbreviation of the incorporated name of the Autogenous Welding Equipment Company, conducting successful job welding establishments in Springfield, Boston, Hartford and Holyoke, has recently added to its line of shops one at 303 Center street, Bridgeport, Conn. It will there carry out a line of repair and manufacture by means of the Davis-Bournonville high pressure, positive mixture oxy-acetylene equipment as well as handling the sale of these equipments throughout the New England States. This company was practically the pioneer of the welding industry in the New England States and has done not only repairs on all classes of heavy machinery, but also on steam boilers.

# American Rolling Mill Practice*

## An Investigation of the Design and Operation of Structural, Merchant, Wire Rod, Slabbing, Plate, Sheet and Skelp Mills

BY DR. J. PUPPE

Structural steel is a product which as far as its economical importance and technical character are concerned is comparable with rails, but the development of the manufacture of wrought iron or mild steel structural shapes is comparatively recent. [For a historical sketch of the evolution of structural steel, written by R. B. Woodworth, Carnegie Steel Company, see *The Iron Age* of April 11, 1912.] As the constructive development of steel sections advanced their economic importance in the American steel industry rapidly increased, necessitating special arrangements for their production on a large scale as in the case of rails, though not to such a degree, owing to the large number of different sections which are required. For the same reason open-hearth steel can more easily be used, as it is not required to roll material in such large quantities as are provided by the Bessemer process. Moreover, open-hearth steel is preferred for structural work of all kinds. In 1890 the production of Bessemer steel structural material was 85,440 tons, as compared with 68,123 tons of open-hearth steel material, and in 1900 the output of structural material from Bessemer steel amounted to 263,800 tons, whereas that from open-hearth steel had risen to 566,092 tons.

As in the case of rails, the ever-increasing demand for structural steel led to the design and construction of special mills, although in consequence of the greater number of sections and difference in their sizes, involving great differences in the size of the initial section, it has not been possible to standardize the rolling operations to the same extent as with rails. The blooming rolls of structural mills are used in a manner conforming much more to European practice than is the case with the blooming rolls working in combination with rail rolling mills, which can be divided into separate stands on account of the almost uniform size of the initial section for the finishing mill.

### Structural Mills

The practice in rolling I-girders differs essentially from German practice in that the preliminary shaping of the ingot is carried much further in the blooming mill, or in a universal slabbing mill as at the Lackawanna Steel Company's works, so that the finishing operation is very much simplified. For this preliminary shaping a great number of passes are made. For instance, it was noted that in roughing down an ingot for a 15-in. girder 37 passes were required which were made in about 6 min. It is clear that by upsiding in the groove a considerable number of rough shapes can be obtained with comparatively few grooves, and that by using heavier ingots the production will be correspondingly increased. At Lackawanna the weight of the ingot was about 6 tons. After roughing down, the ingot was cut into three lengths of about 16 ft. each. The rough section measured about 15 in. deep, width of flange 12 in., thickness of flange 1¼ to 1½ in., and thickness of web 2¾ in., so that eight passes in the finishing mill were sufficient to finish a 15-in. girder. All girders over 9 in. deep are roughed out in the blooming mill in this manner at that company's works, and, according to the views of the men in charge of the rolling mill, the method has proved quite satisfactory. In Germany, however, the standard girders never receive their preliminary shaping in the blooming rolls, the section being formed entirely in the finishing mill. Only in the universal mills of Grey, and of Sack and Puppe, is it necessary for the ingot to be shaped out roughly in the blooming rolls first.

The type of mill for rolling structural steel is the three-high mill which was first used by John Fritz in 1857 at the works of the Cambria Iron Company for rails and structural iron, and represents the standard type of rolling mill for this class of work. Two-high mills are, of course, also used where the plan of subdividing the mill into several trains has been adopted. The diameter and length of roll of these mills show that these dimensions are influenced by the nature of the work to be performed. In many instances the roll diameter is considerably less than is usual in German practice. As the diameter is chiefly determined by the size of the I-beams and channels, the smaller diameters usual in American practice are no doubt possible owing to the preliminary shaping which the girders receive in the blooming rolls and the consequent small

*Table I.—Structural Mills*

| No. | Name of Company | Type | No. of Stands | Type of Engine | Revolutions | Roll Diameter (mm.) | Initial Section | No. of Passes | Production |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Lackawanna Steel Co., Struct. Mill No. 2. | Three-high | 3 | Flywheel steam engine | ..... | 610 | ..... | ..... | 140,000 tons yearly |
| 2 | Carnegie Steel Co., Homestead. | Three-high<br>Three-high | 2<br>2 | Flywheel steam engine | .....<br>..... | 840<br>650 | ..... | ..... | 1,600 tons daily |
| 3 | Carnegie Steel Co., Homestead. | Three-high | 2 roughing<br>1 finishing | Flywheel steam engine | ..... | 900 | Rough-shaped material | Varies | 16,000-20,000 tons monthly |
| 4 | Jones & Laughlin Steel Co. | Three-high | 2 | Tandem Corliss | 60–110 | 660 | Various sizes | 6–10 | Varies |
| | | Three-high | 2 | compound direct coupled | 80–90 | 1,680 | | | |
| 5 | Bethlehem Steel Co. | Three-high | 3 | Twin tandem compound | ..... | 715 | ..... | ..... | 400 tons in 10 hours |
| 6 | Bethlehem Steel Co., Grey rolling mill. | Two-high blooming<br>universal finishing mill | 1<br>2 | Twin tandem compound reversing | Geared 3:5 direct coupled | 1,170 | Weight of ingot 7.7-8.2 tons | I. 17-25<br>II. 5-7 | 800-1,000 tons daily |
| 7 | Illinois Steel Co., struct. mill No. 1. | Two-high reversing<br>three-high<br>two-high | 1<br>2<br>1 | Twin tandem compound reversing | 150 max. | 813 dia. x 1980<br>710 dia. x 1676 | 12x15 in. down to 4x4 in. | ..... | 168,000 tons yearly |
| 8 | Illinois Steel Co., struct. mill No. 2, attached to two-high reversing blooming mill, 35½ in. in diameter. | Two-high<br>three-high<br>two-high<br>two-high | 4<br>2<br>1<br>1 | Alternating current induction motors | 91 | 600 dia. x 1,115<br>610/533 dia. x 1,200<br>533 dia. x 915 | ..... | 4<br>4<br>1<br>1 | 12,000 tons monthly |

*Paper substantially in full read before the Iron and Steel Institute. Part I of the paper was printed in *The Iron Age*, October 10, 1912.

*Table II.—Merchant Mills*

| No. | Name of Company | Type | No. of Stands | Type of Engine | No. of Engine | Capacity, hp. | Diameter Roll (mm.) | Initial Section of Ingot or Billet | No. of Passes | Output |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Lackawanna Steel Co. merchant mill No. 6 | Three-high<br>Three-high<br>Two-high | 3<br>4<br>2 | Horizontal vertical engine | 1 | 1400 | 406<br>305<br>203 | 6x6 in. Max. Length, 9 ft. | Varies | 75,000 tons yearly |
| 2 | Lackawanna Steel Co. merchant Mill No. 9 | Continuous | 6<br>2 | Tandem Corliss<br>Compound Corliss | 1<br>1 | ..... | 305<br>254 | 1¾, 2, or 2½ in. dia. | 14 max. | 10,000-12,000 tons monthly |
| 3 | Carnegie Steel Co.... (Duquesne) | Two-high<br>Half continuous | 4 Continuous<br>6 | Tandem Compound | 1 | ..... | 330 | ..... | 10 max. | 700 tons daily? |
| 4 | Carnegie Steel Co.... (Duquesne) | Two-high<br>Half continuous | 4 Continuous<br>6 | Tandem Compound | 1 | ..... | ..... | ..... | 10 max. | 480 tons daily? |
| 5 | Carnegie Steel Co.... (Ohio), Union Wks. "cross-country mill" | Half continuous | 6 Two-high<br>1 Three-high | ..... | 1 | 1500 | 254 | 1½x1½ in. up to 3½x3½ in. | 8 | 500 tons daily of the heavier sections |
| 6 | Carnegie Steel Co.... (Ohio), Union Wks. cotton tie mill | Continuous | 9 | ..... | ..... | ..... | 254 | 1½x1½ in. | 9 (Reduction 36%) | 80 tons in 12 hours |
| 7 | Jones & Laughlin Steel Co. | Half continuous | 5 Continuous 6; stepped rolls | Direct Coupled Belt Drive | 1<br>1 | 900<br>900 | 310<br>310 | 4x4 in. | 6–11 | Average, 175 tons to 230 tons |
| 8 | Indiana Steel Co.... (Gary) | Half continuous | 5 Two-high<br>2 Three-high | Induction motors | 1 (stands 1-6)<br>1 (stand 7) | 3200<br>650 | 450 | Up to 6x6 in. | 9 | 14,000 tons daily |
| 9 | Indiana Steel Co.... (Gary) | Half continuous | 5 Two-high<br>2 Three-high | Induction motors | 1 (stands 1-6)<br>1 (stand 7) | 3200<br>650 | 350 | ..... | 9 | 11,000 tons monthly |
| 10 | Indiana Steel Co.... (Gary) | Half continuous | 5 Continuous<br>1, 3-high<br>1, 3-high<br>1, 2-high | Induction motors | 1 (stands 1-5, 7)<br>1 (stands 6 & 8) | 2000<br>650 | 1–4<br>355<br>305 | ..... | 10 | 9,000 tons monthly |
| 11 | Indiana Steel Co.... (Gary) | Half continuous | 5 Continuous 4; stepped rolls | Induction motors | 1 | 2500 | 355<br>300 | 2x2 in. up to 4x4 in. | 9 | 9,000 tons monthly |
| 12 | Indiana Steel Co.... (Gary) | Half continuous | 6 Continuous<br>3 (2 with stepped rolls) | Induction motors | 1 | 2000 | 254 | 2x2 in. or 3x3 in. | 12 | 7,000 tons monthly |

number of passes in the finishing mill. This varies considerably of course, and depends upon the size of the initial and the final sections, the aim being to insure steady working by not allowing too long pauses to occur in one or another stand of rolls, assuming that the supply of ingots or billets is not sufficient to allow the blooming and finishing mills to work independently. That would always be the case where, as at the Jones & Laughlin works, the blooming mill has to supply besides a continuous billet mill. Nevertheless, the number of passes varies between one and five in the first three-high mill alone, and the mill is so arranged that only two passes are given in the following stand and one in the finishing rolls.

In a single instance, that of structural mill No. 2 of the Illinois Steel Company, one of the newest installations, the number of passes is definitely fixed and is dependent upon the arrangement of the stands, as in rail rolling mills. Such an arrangement demands a blooming mill which supplies material of the required rough section; in this instance a 35-in. two-high reversing mill is installed which supplies this structural mill alone.

Whereas in Germany at the present time two rolling mills for special girders have been installed, one at Differdingen and one at Rombach, in the United States there is only one such mill, of the Grey type, at Bethlehem, in which 30-in. girders with 15-in. flanges have lately been rolled. It is noteworthy that the slope of the inner side of the flange, which in Germany amounts to 9 per cent., has been reduced to 2 per cent. at Bethlehem, so that the faces of the flange are practically parallel. The mill being of the standard Grey type, with very little bevel on the ends of the horizontal rollers, the friction on the inside

*Table III.—Wire Rod Mills*

| No. | Name of Company | Type | No. of Stands | Type | Capacity (hp.) | Roll Diameter | Initial Section | No. of Passes | Speed of Leaving Rolls | Output |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Jones & Laughlin Steel Co. (Aliquippa) | Continuous | 16 | Flywheel compound | 2080 i.h.p. | 6 stands 12 in. 10 stands 10 in. | 1⅝x1⅝ in. | 16 | 3,350 ft. per minute | 194 tons in 12 hours |
| 2 | American Steel & Wire Co. (American Wks) | Continuous<br>Continuous | 5<br>16 | Flywheel compound | 1400 | 10 in. | 4x4 in. | 21 | 3,350 ft. per minute | 1 bundle finished in 40 seconds |
| 3 | Amer. Steel & Wire Co. (Amer. Wks.) | Garrett | 2 roughing<br>3, 1 loop<br>4, 2 loops<br>4, 3 loops | Flywheel compound<br>Flywheel compound | 1000<br>3300 | .....<br>10 in. | 4x4 in. | 18–22 | ..... | 200 tons in 12 hours |
| 4 | Youngstown Sheet & Tube Co. (Struthers) | Continuous | 16 | Horizontal-vertical compound engine | ..... | ..... | 1⅝x1⅝ in. | 16 | ..... | ..... |
| 5 | Amer. Steel & Wire Co. (Waukegan) | Continuous | 8 | 1 flywheel (bev. wheels) | 2500 | 15 in. | 4x4 in. | 8 | ..... | ..... |
| | Half-continuous | Continuous | 12 | 1 flywheel (bev. wheels) | 2000 | 10 in. | ⅝ in. diameter ½ in. | 12 | ..... | ..... |
| | | 3 loops | 11 | 2 flywheel (belt) | 1200 each | 10 in. | ⅝ in. diameter ½ in. | 11 | ..... | ..... |
| | | Continuous | 4 | 1 flywheel (belt) | 1200 | 10 in. | ⅝ in. diameter ½ in. | 10 | ..... | ..... |
| | | 1 loop | 2 | | | | | | | |
| | | 1 loop | 4 | 1 flywheel (belt) | 1200 | 10 in. | | | | |

face of the flange is very great and the differences in the surface speed are also considerable.

With regard to construction, the Grey rolling mill at Bethlehem differs chiefly from that at Differdingen in that in the latter mill the billet is first rough shaped in a cogging mill and is finished in a single stand of the Grey type, whereas at Bethlehem two Grey mills are installed for the purpose of increasing the output and of giving a slope of 2 per cent. to the inner faces of the flange. A few constructional improvements have been made in the Grey mills at Bethlehem, but otherwise they are built on exactly the same principle as the one at Differdingen. The number of passes varies between 17 and 25 in the first stand and between 5 and 7 in the second, according to the final shape of the section. In the case of heavy girders with especially wide flanges and a short web, only one pass is made in the second rolls. For roughing out the section in the blooming rolls as many as 27 passes are made. The maximum output in 12 hours, of giving large orders for material in comparatively few sections, which again can be allotted to works especially equipped for dealing with a few particular classes of product. Under these unusually favorable conditions a type of plant has been developed for turning out large quantities of light sections, though such plant, if it had to work under European conditions, could not possibly be run at a profit.

The dividing up of the stands into separate trains depends upon the facility for bringing back the bar. If this is not practicable a two-high mill is used in conjunction with a three-high mill, the latter being provided with the object of doing work on the bar during its return. The arrangement is then similar to that adopted at various rail mills, and at No. 2 structural mill at the Illinois Works the three merchant mills at Gary (Nos. 8, 9 and 10, Table II), and Carnegie mill at Ohio (No. 5, Table II), are laid out on that plan.

The hoop iron mill for cotton ties (No. 6, Table II)

*Table IV.—Slabbing and Universal Mills*

| No. | Name of Company | Type | Horizontal Rolls: Type and Dimensions (mm.) | Horizontal Rolls: Gear Ratio | Vertical Rolls: Type and Dimensions (mm.) | Vertical Rolls: Gear Ratio | Rolls: Horizontal No. | Rolls: Horizontal Dimensions (mm.) | Rolls: Vertical No. | Rolls: Vertical Dimensions (mm.) | Class of Material Rolled | Output |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Lackawanna Steel Co. | Slabbing two-high | Twin reversing engine | 2.25:1 | Reversing engine | 1.5:1 | 2 | 813 dia. x1,829 | 3 | 559 dia. | Slabs up to 1,372 x 762 mm. Universal plates, blooms, billets, rough-shaped for I-beams over 9 in. depth | ..... |
| 2 | Lackawanna Steel Co. | Universal No. 5 two-high | Reversing engine, 8,000 h.p. | .... | Two reversing engines | Direct coupled | 2 | 762 dia. | 4 | 445 dia. | Universal plates up to 1,219 mm. wide. Blooms up to 1,825 mm. wide | 150,000 tons yearly |
| 3 | Carnegie Steel Co. (Homestead) | Slabbing two-high | Twin reversing engine 3,200 h.p. | 19:37 | Reversing engine | 22:32 | 2 | 815 dia. | 2 | 508 (In special housings) | Slabs and blooms | ..... |
| 4 | Carnegie Steel Co. (Homestead) | Universal two-high | Twin reversing engine 3,200 h.p. | 25:29 | Same engine | .... | 2 | 660 dia. (Reinforced by 2 rolls of greater dia.) | 4 | 410 | Universal plates armor plates up to 1,000 mm. wide | or 1,500 tons daily |
| 5 | Carnegie Steel Co. (Homestead) | Universal two-high | Twin reversing engine 5,900 h.p. | Direct coupled | Same engine | .... | 2 | 915 dia. | 4 | 445 | Plates up to 1,220 mm. wide | 585 tons daily; 10,300 tons monthly |
| 6 | National Tube Co.. | Slabbing two-high | Twin reversing engine | 5:7 | Twin reversing engine | 5:7 | 2 | 815 dia. x1,650 | 2 | 890 dia. | Plates from 356-1,030 mm. wide. Slabs for Universal mill | 220,000 tons in 1910 |
| 7 | National Tube Co.. | Universal three-high (Lauth) | Tandem compound, 4,000 h.p. | .... | Same engine | .... | 3 | .... | 2 | 635 dia. x1450 | Plates from 230-1,080 mm. wide, very thin | ..... |
| 8 | Indiana Steel Co.. (Gary) | Universal three-high | Induction motor, 4,500-6,000 h.p. | 4:3 | Same motor | .... | 3 | 900 dia. x2,150 | 4 | 510x880 | Plates 350-1,525 mm. wide x 7-50 mm. thick. Maximum length 43 m. Blooms up to 1,825 mm. wide | Plates 36m x1,423 x9.5 mm. are rolled in 19 passes from a slab 1,423 x 1,524 x 254 mm. Time, 82 sec.; reduction, 16% |
| 9 | Illinois Steel Co.... | Universal two-high | Ilgner-Leonard control; induction motor, 1,300 h.p.; two motors at 2,000 h.p. 575 volts | Direct coupled | Same motor | .... | 2 | 610 dia. x1,700 (Journal 457 dia.) | 4 | 356 dia. x330 (Journal 203 dia.) | Plates 165-750 mm. wide, 12-7-50.8 mm. thick, maximum length, 24 m. | 75,000 tons yearly |
| 10 | Youngstown Sheet & Tube Co. | Universal two-high | Twin reversing engine | .... | Same engine | .... | 2 | .... | .. | .... | Plates up to 1,040 mm. wide. Blooms up to 1,680 mm. wide | ..... |

using 8-ton ingots, is given as 800 tons. Noteworthy also are the straightening presses, in which the finished girders are straightened in their horizontal position immediately after leaving the rolls. The distance between the two Grey mills is 303 ft. The hot beds upon which the girders are laid are of specially strong construction, in order to prevent the bending of heavy sections.

### Merchant Mills

The economic advantages which apply to structural mills and the supply of structural steel apply also to the manufacture of merchant sizes, but the product being much lighter, the mills for rolling it differ from the ordinary structural mills in arrangement and construction. Here also the great demand for merchant sizes has led to the concentration of merchant mills in large works, so as to facilitate manufacture on a large scale, the conditions for which are very much favored by the practice at Ohio is specially noteworthy on account of the fact that only one section is rolled, and, notwithstanding the very small dimensions of the hoop iron, a very large output is obtained. This result is due to the ability to work at a very high pressure, and to the fact that parts of the mill have, in a measure, become so adapted to the one section that breakdowns are almost unknown, thus proving how very favorably the capacity and the economy of a rolling mill are affected by subdivision, and by keeping to one class of work only. An ordinary efficient high-speed or merchant mill working on a number of sizes of hoop iron, but otherwise under the same conditions, would scarcely produce 30 tons per day on an average. The specialization of rolling mills cannot be carried to the same point under European conditions which only admit of a limited subdivision, by reserving some mills for round and square iron, others for flats and hoop iron, and others again for sections. In the two Ohio works

*Table V.—Plate Mills*

| No. | Name of Company | Type | Type | Revolutions | Capacity (h.p.) | Rolls—Diameter (mm.) | Rolls—Length (mm.) | Yearly Output, Tons |
|---|---|---|---|---|---|---|---|---|
| 1 | Carnegie Steel Co. (Homestead) | Three-high first stand (Lauth) | Tandem compound direct coupled | 85 | 1300 | 762 | 1840 | 45,000 |
| 2 | Carnegie Steel Co. (Homestead) | Three-high first stand (Lauth) | Tandem compound | ..... | 2550 | ..... | 2140 | 100,000 |
| 3 | Carnegie Steel Co. (Homestead) | Three-high (Lauth) | Flywheel steam engine direct coupled | 78 | 2000 | 864 middle roll 533 | 3250 | 170,000 |
| 4 | Carnegie Steel Co. (Homestead) | Three-high with rolls of equal diameter | Tandem compound direct coupled | ..... | 3000 | 965 | 3560 | 178,000 |
| 5 | Illinois Steel Co. | Three-high first stand (Lauth) Three-high second stand (Lauth) | Flywheel steam engine for both stands | 60 | ..... | 863 (460) 915 (530) | 2300 3350 | 135,000 |

mentioned there are altogether 23 merchant mills, which makes it possible for each mill to run on a class of product which varies as little as possible in size.

The diameter of the merchant mills for the smallest sections is usually 10 in., increasing to 18 in. for larger sections. Comparatively large sections are rolled in the 18-in. mills, and in view of the short length of the body of the roll the choice of size appears to be quite justified. In an ordinary three-high mill an intermediate mill with 24-in. rolls would be required for these sections.

### Wire Rod Mills

The wire industry belongs to the more recently established branches of the steel industry of the United States, the production of wire rods and wire nails having been developed in the eighties. The great importance of the wire rod and wire manufacturing industry in America is apparent from the statistics of the iron and steel trade in 1909; for instance, the production of rails was 3,111,583 tons, of structural steel 2,275,562 tons, and of wire rod 2,335,685 tons. This enormous output of wire rod, which exceeded that of structural steel, and was only about 20 per cent. less than that of rails, is explained by the fact that not only home requirements are supplied, but a large export trade in wire and wire nails has been built up. From 1894 to 1908 the export of wire rose from 20,329 tons to 174,690 tons, and that of wire nails from 10,394 tons in 1898 to 43,559 tons in 1908.

The practice of wire rod rolling differs from the German and British practice in that practically the only size rolled is No. 5—5.4 mm. diameter, or about 7/32 in. No. 6, which is the usual size in Europe, is hardly ever manufactured. But the American wire rod differs not only in diameter, but also as regards the quality of the finished product. The rods vary considerably from a true circular section, so much so that in many cases they can hardly be called round iron at all, whereas in German practice a good circular section is the rule. One disadvantage of making rods of irregular section is that very heavy wear and tear of the draw-plates results in drawing the wire, and it is now almost the universal practice to use chilled metal for the draw-plates, as steel plates will not stand. It is considered, however, that it is a more profitable thing to aim at a large production than to bestow care upon these technical details, attention to which is less necessary on account of the fact that most of the important wire rolling-mills have wire-drawing works attached to them, which have no option but to take the material supplied by the mill in connection with which they work.

It is undoubtedly possible to obtain a larger production by rolling a thicker size of wire rod, but calculation would probably show that any advantage so gained is completely neutralized by the increased number of rejections, a greater expenditure on draw-plates and a larger number of drawing operations. In fact, the cost of working up wire rods of special quality, of No. 5 hardness or upwards, such as are used for wire ropes and other special purposes, would be prohibitive if they were not accurately round, a fact which no doubt accounts for the importation of wire rods of high quality when required for special purposes.

With regard to the arrangement of wire mills, the older type, known as the Belgian, also the German or Garrett type, are still in use as well as the continuous mill, which has been brought to a high degree of perfection by the Morgan Construction Company. A few characteristic details may be mentioned. In the first place, the continuous wire mill has been more and more widely adopted, which is no doubt due to the fact that the continuous type, while giving nearly as large an output as the Garrett mill, is more economical on account of the very small amount of labor required to serve it. The quality of the finished product of a continuous mill is, however, much inferior to that of a Garrett mill, which, in the author's opinion, is due not only to the practice of rolling several wires alongside of one another, which is also a feature of the Garrett mill, but principally to the fact that the rod is likely to be stretched between the several stands, and the effect of this straining is at once noticeable in the finished rod. The stretching is primarily due to variations in the structure and dimensions of the billet as well as to the uneven heating of the billet and blowholes in the material, and it is quite impossible to control or entirely to remove these defects.

In rolling flats, tube strip or hoop iron in continuous mills the difficulty is met by means of special guides, it being absolutely necessary to guard against a reduction of section due to stretching in the case of such material, as the pieces would be useless if they were of uneven thickness. But, in the case of wire rod, the main object, as before stated, is to get a large output rather than a high quality of rod, the home consumers being dependent on the manufacturers on account of the high protective duty.

*Table VI.—Sheet Mills*

| No. | Name of Company | Number of Stands Roughing | Number of Stands Hot Rolls | Number of Stands Cold Rolls | Type | Revolutions | Capacity h.p. | Number of Stands Driven by an Engine | Rolls—Length (mm.) | Rolls—Diameter (mm.) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Jones & Laughlin Steel Co. Hot rolling mill | .... | 24 | .... | Tandem compound | 28 | 3000 | 12 | 760–915 | 710 |
| 2 | Jones & Laughlin Steel Co. Cold rolling mill | .... | .... | 18 | Flywheel compound | 40 41 42 | 768 | 18 | 815–915 | 610 |
| 3 | American Sheet & Tinplate Co. (Vandergrift) | 16 | 24 | 8 | Flywheel steam engine with countershaft | 75 | 1600 each | Two engines each driving 20 stands one engine driving 8 stands | 1,016-1,420 965-1,420 | Hot rolls 610 Cold rolls 610–660 |
| 4 | Youngstown Sheet & Tube Co., new mill | 4 | 8 | 4 | Tandem compound | 30 | 2000 | 16 | Hot rolls 865-1,425 Cold rolls 1,015-1,425 | ..... |
| 5 | Youngstown Sheet & Tube Co., old mill | 3 | 6 | 3 | Tandem compound smaller engine | ..... | ..... | ..... | 1,016-1,425 | ..... |

In the five wire rolling-mills which were inspected, five entirely continuous mills were noted and only one Garrett mill. The continuous mills are always arranged in two sections, six stands generally forming a roughing train in which the bar is first rolled down, being afterward finished in the subsequent continuous stands. The number of stands depends upon the initial section, but there are generally 16 stands, the initial section of the billet being 1⅞ x 1⅞ in. The continuous wire-rod mills of American Steel & Wire Company (No. 3), which consists of two blooming stands and three roughing and finishing sets. The 4-in. billet is rolled down in 18 to 22 passes, according to the required thickness of the wire rod. In comparing the advantages and disadvantages of the two types of wire-rolling mills, the fact has to be taken into consideration that with the latest type of Garrett mill the number of hands required to serve the mill has been reduced by the introduction of "repeater" guides, and these

*Table VII.—Skelp Mills—Particulars of -Drive*

| No. | Name of Company | Type | No. of Stands | Type of Engine | No. of Engines | Capacity | Roll Diameter (mm.) | Class of Material Rolled | Initial Section (mm.) | Produc. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | National Tube Co.... | Continuous | 5<br>4+1 finishing | Flywheel steam engine | 1<br>1 | ....<br>.... | 330 | Tube strip 152–355 mm. wide | 102-160 | ..... |
| 2 | National Tube Co.... | Continuous | 6<br>4 | Flywheel steam engine | 1<br>1 | 2400<br>800 | 305 | Up to 300 mm. wide | ..... | 570 tons 12 hours |
| 3 | National Tube Co.... (Lorain) | Continuous | 11 (stand 2 with vertical rolls)<br>3 | A. C. motors | 1<br>1 | 2500 | 406 | ..... | ..... | ..... |
| 4 | American Steel & Wire Co. (Cleveland) | Half continuous | 6 two-high continuous<br>3 three-high<br>1 two-high finishing | Induction motor | 1 | 1800 | ..... | Hoop iron 63–178 mm. wide by 1.19 thick | 102–160 | 90 tons 10 hours (average kilowatt consumption per hour, 700-800) |
| | | | 2 two-high<br>1 finishing | Flywheel transformer with D. C. motors | 1 | 800 | ..... | | | |
| | | | | 575 volts | 1 | 800 | ..... | ..... | ..... | ..... |
| 5 | Youngstown Sheet & Tube Co. | Continuous | 6<br>4 | Flywheel steam engine | 1<br>1 | ....<br>.... | 254 | Tube strip up to 125 mm. wide | ..... | ..... |
| 6 | Youngstown Sheet & Tube Co. | Half continuous | 1 three-high roughing stand with 2 vertical rolls<br>3 continuous | Tandem compound direct coupled<br>Tandem compound geared | 1<br>1 | ....<br>.... | 510<br>410 | ..... | ..... | ..... |

the American Steel & Wire Company, on the other hand, uses 4-in. billets in the older Garrett mills, and has retained this size in the newer continuous mills, for the reason that their blooming and billet mills produce such billets very economically. The two continuous mills (Nos. 2 and 5) consequently consist of 21 and 20 stands respectively. In No. 2 mill the two groups of stands are arranged at right angles to each other, and the rod, after roughing down, is turned round through an angle of 90 deg. Between the turning table and the first finishing stand a reheating furnace is interposed. The five roughing stands might be regarded as a billet mill, especially as the 16 finishing stands are further subdivided into two sets, between which a shears is interposed.

One of the largest wire-rod mills is that of the American Steel & Wire Company at Waukegan (No. 5), in which one continuous roughing train of 8 stands supplies an entirely continuous mill and two mixed mills with material. The bar, about 1⅞ in. square, coming from the continuous roughing rolls is led to the three trains, in which it is immediately finished in several loops. The performance of the roughing mill is quite remarkable, and shows how well the continuous mill is suited to the conditions of a large output. The eight stands deal with the whole production, averaging about 800 tons per 24 hours, the maximum achievement being 957 tons. As this is on a scale with the performance of a continuous billet mill, this roughing train may also be characterized as a billet mill rather than as a rod mill.

According to the foregoing, the economy and capabilities of the continuous mills may be summed up under two heads, namely, output and quality of product. The output, as has been noted, is exceedingly high, but, on the other hand, the product is not of high quality. The special applicability of continuous mills would, therefore, be to the production of semi-products, such as billets, flats or wire rod. As roughing trains for merchant mills or mills for hoop iron and small sections they are not to be recommended from the point of view of output, especially where several merchant mills require to be served. Another drawback is that the stretch of the rod between two stands, with the resulting variation in section, cannot be guarded against, and this, under European conditions, would inevitably lead to the rejection of the material.

The only simple Garrett mill observed was that of the mills now require no more labor than the continuous mills. The roll diameter of the wire mills is stated to be 10 in., though it may be asumed in the case of the non-continuous mills that the diameter of the last stand of rolls is somewhat larger, in order to prevent the loops becoming too great.

The great outputs of the wire rolling-mills are obtained by a comparatively heavy pressure on the rolls such as soft material can readily stand, but, above all, by employing, in the continuous mills, a very high rate of speed on leaving the rolls. In non-continuous mills the speed is limited to about 22 to 25 ft. per second, as this is the maximum speed at which it is possible for a man to catch the end of the rod. This would be about the speed in the wire rolling-mills in Germany. In the American continuous mills, on the other hand, the speed of the wire on leaving the rolls, as shown in Table III, is 3350 ft. per minute, or 56 ft. per second, whereas in the only German continuous wire rolling-mill at Esch the speed with which the wire leaves the roll is not more than 48 ft. per second.

### Slabbing and Universal Mills

The slabbing mill with vertical rolls is a type of mill which is not familiar in European practice. In discussing blooming mills in Part I of the paper,* it was mentioned that the latter are not available for rolling billets of different sections, and particularly slabs, as they are kept fully occupied in supplying material to the mills forming an integral part of the installation. A kind of modification of a blooming mill has been developed which serves both for blooming in the ordinary way and for rolling slabs and flat blooms.

The American slabbing mill is a universal mill with two reversible horizontal rolls and two or three vertical rolls running in housings of special construction. Such mills are used for rolling out blooms and universal plates, also for heavy square billets. Or the vertical rolls can be removed from their bearings and the mill used for rolling thick plates. With the vertical rolls it can also work as an ordinary blooming mill, and by using grooved rolls, I-girders can be roughed down on it, as at the Lackawanna Steel Company's works. Thus, in the case of this mill, it is to be

*The first part covering American blooming, billet and rail mills was printed in *The Iron Age*, October 10, 1912.

noted that the manufacture of various intermediate products is concentrated in one unit, in contrast to the prevailing practice of specialization, by running a whole plant on one class of product only.

The arrangement of three vertical rolls, of which one is driven by the friction of the bloom (No. 1, Lackawanna Steel Company), is such as to permit the rolling of slabs and blooms to as great a width as possible without unduly weakening the mill, and also to give a better grip of the piece. The same object is attained in the slabbing mill of the National Tube Company by mounting the vertical bevel gear wheels on two special shafts, which permit of the horizontal bevel wheels to clear one another when the rolls are brought close together (Fig. 1). In order to cause them to bite better the vertical rolls are roughened. In the Lackawanna mill it is possible to roll slabs of a minimum width of 18½ in., and in the National Tube Company's mill of 14 in. At the same time there is sufficient room for bevel gear wheels of an exceptionally heavy design, the pitch circles of the wheels in the present case being 57 and 52 in. respectively.

Within the author's knowledge an attempt has been made in Germany to adopt the latter form of construction in a universal mill for slabs of 44 in. maximum width down to strip under 8 in. width. The lack of success was due not to any defect of design, but simply to economical causes, as it did not pay to roll narrow strips in a heavy universal mill requiring motive power sufficient for driving the mill when working on material of the maximum size. In other respects, too, these slabbing mills are of very massive construction, being designed to take ingots and slabs averaging 6 to 7 tons and sometimes 10 tons in weight.

The following figures give some idea of the size of the Lackawanna slabbing mill: Weight of bed plates, 161 tons; weight of bed plate girders, 69.7 tons; weight of housings for horizontal rolls, 115 tons; weight of housings for vertical rolls, 81.5 tons; weight of pinion housings, 63 tons. The total weight of this rolling mill, including roll beds and engines, is 1900 tons. The comparatively small roll diameter of 32½ in. in all the slabbing mills inspected is due to the very compact construction and short length of roll body, but it permits of reducing the cross-section in large percentage at a time with a low power consumption. In the presence of the author a plate, 66½ in. wide by ⅜ in. thick, was rolled down from a slab measuring 37 x 4¼ in. x 6 ft. 2 in. long in 15 passes, the time being 74 seconds, which corresponds to an average reduction of section of 12 per cent. per pass, which is a very high ratio.

In all the universal mills inspected except one the arrangement differs from the usual German arrangement in having a pair of vertical rolls on both sides of the stand. This has the advantage that both in the three-high and reversing two-high types the piece is worked in each direction under equal conditions. That the practical importance of such an arrangement is not of much value is shown by the fact that this form of construction has been abondoned in newer mills, or, at all events, is now very seldom adopted. Constructional considerations are also opposed to it, as a second pair of vertical rolls only adds to the chances of a breakdown.

There was also noted at the works of the National Tube Company a three-high Lauth mill which rolls plates of great length and of extreme thinness. This mill is very compactly built in order to ensure even thickness in the plates. It is driven by a 4000-hp. engine, the revolutions of which can be varied from 80 to 135 per minute, so that the roll speed may be increased as the plate cools during rolling. Plates measuring 120 ft. long, 23½ in. wide, and ⅛ in. thick were rolled and finished in 75 sec.

A three-high mill with the rolls all of equal diameter was seen at the works of the Indiana Steel Company. The method of driving this mill, which may be regarded as standard for this type, will be discussed. The universal rolling mill of the Carnegie Steel Company at Homestead shows a peculiar arrangement. It has a reversing two-high mill with a pair of vertical rolls on either side of the stand; the horizontal rolls are stiffened by idle rolls of nickel steel larger in diameter than the driven rolls, and placed one above and one below these. Hard armor plates of considerable width are rolled, and the high production of 1500 tons in 24 hrs. is only rendered possible by this construction, especially as the diameter of the horizontal rolls is somewhat small for the conditions. The American universal mills are mostly arranged so that the vertical rolls can be removed for rolling sheets, which is a particularly useful feature, as they can then work on sheets for stock when not full up with orders for universal plates. The mills are made to take plates as wide as possible; for instance, at Gary plates 14 to 60 in. in width are rolled, whereas in Germany 43 in. is seldom exceeded.

*Table VIII.—Tests of Steam Consumption of Blooming Mill Engines*

| Size of Mill | Mill and Location | Type of Engine | Dimensions (in.) | Size of Ingot | No. of Passes | Final Section | No. of Times by Which Piece is Lengthened | Remarks | Steam Consumption per Ton, Kilograms: Of Material Rolled to Length as Given in Col. 7 | Steam Consumption per Ton, Kilograms: In Terms of Rolling to 8 Times Original Length |
|---|---|---|---|---|---|---|---|---|---|---|
| 40 in. | Bessemer, Pa. Two-high mills | Allis-Chalmers tandem compound | 50/78x60 | Head 17¾x18½ in. Base, 18½x19¾ in. Length, 5 ft. 3 in. | 7 | 91x9½ in. 21 ft. long | 4 | Condensing | 82.5 | 130 |
| 43 in. | Youngstown, Two-high mills | Allis-Chalmers tandem compound | 52/90x60 | Head, 17¾x19¾ in. Base, 19¾x21½ in. Length, 4 ft. | 9 | 8x8 in. 24 ft. long | 6 | Condensing | 104 | 12 |
| 38 in. | Duquesne, Reversing mills | MacIntosh-Hemphill twin-reversing engine* | 42x60 | Head, 17½x20 in. Base, 18½x21½ in. Length, 5 ft. 9 in. | 13 | 8½x7½ in. 32 ft. 9 in. long | 5.7 | Non-condensing | 270 | |
| 36 in. | South Sharon, Reversing mills | Allis-Chalmers twin tandem compound | 42/70x54 | Head, 17¾x19½ in. Base, 20¼x22¼ in. Length, 5 ft. 4 in. | 19<br>21 | 7½x3 in. 82 ft. 2 in. long<br>5½x5½ in. 79 ft. 6 in. long | 15.5<br>15 | Condensing | 280 | |
| 40 in. | Aliquippa, Reversing mills | MacIntosh-Hemphill twin tandem compound | 44/70x60 | Head, 19¾x21½ in. Base, 21½x23 in. Length, 5 ft. 2 in. | 25 | 6½x6½ in. 59 ft. 4 in. long | 11.5 | Condensing<br>Non-condensing | 300<br>520 | 270<br>420 |
| 40 in. | Duquesne | MacIntosh-Hemphill twin tandem compound† | 40/70x60 | Head, 17½x20 in. Base, 18½x21½ in. Length, 5 ft. 9 in. | 19<br>25 | 6x4 in. 86 ft.<br>6x4 in. 3 in. | 15<br>15 (spring mill) | Condensing<br>Non-condensing | 490<br>580 | 325<br>390 |

*Steam consumption, 23.9 lbs. per hp-hrs. †Steam consumption, 22.3 lb. per hp-hr.

### Plate Rolling-Mills

For rolling heavy plates, three-high mills, especially of the Lauth type, are more often used in the United States than any other type, whereas both in Germany and England the reversing two-high mill is preferred, especally for thicker plates, and when the length of roll exceeds 6 ft. 6 in. It is difficult to account for the origin of the use

of the three-high mills, with their heavy lifting tables and complicated gear, and the reason can hardly be sought in the simpler method of driving, considering that the steam reversing engine has reached a stage of high perfection, and that electric driving is also available. Moreover, in the case of universal rolling mills the reversing two-high type predominates. In the matter of output the two types of mill are also about equal, and the only reason to account for the retention of the three-high is that it has long been a favorite type in America.

A departure from the ordinary kind of construction of a three-high plate mill is exhibited in the heavy plate mill of the Carnegie Steel Company, an example of which is probably not to be found in Europe. In this mill the middle roll is stationary and the upper and lower roll are alternately raised and lowered. At the works of the Illinois Steel Company are two three-high stands working in connection with each other, the second of which has rolls of a larger diameter, on account of the necessary acceleration during the rolling process. This arrangement of two stands for roughing and finishing increases the capacity of the mills and also improves the appearance of the plates, since the work of rolling is distributed betwen the two stands in such a manner that the finishing rolls are subjected to less wear and tear than the rolls of the first stand.

This method of work and arrangement has lately been increasingly adopted in England for structural and ship plates, the usual arrangement being to place the two stands one behind the other, with the object of saving as much space as possible. The roll diameters are often remarkably small compared with those usual in European practice. For a roll length of 10 ft. 8 in., German practice would require a diameter of at least 39 in.. and probably one of 43½ in. would be considered desirable, whereas in America 34½ in. is considered sufficient. It would appear, therefore, that the risk of breakdown does not weigh so much as the ability to work with a less power consumption and obtain to a higher production, a necessary condition being, of course, that the ingots or slabs should be well and uniformly heated, a matter which presents no difficulty in view of the unlimited supply of cheap fuel.

### Sheet Mills

One of the most recent industries of the United States is the sheet and tin plate industry, which owes its rise largely to the increased protective tariff introduced in 1891 and to the enormous demand for tin plate in the country. Prior to that date the high price of raw materials, high wages and inability to dispense with manual labor in the manufacture of tin plate had presented great obstacles to the establishment of a home industry; but, after 1891, tin plate mills rapidly sprang up in many places, an additional impetus being given by a lowering of the price of raw materials, due to a depression in the iron trade about that period and a simultaneous fall in wages. Some idea of the growth of the industry can be gathered from the statistics of production, which show that the quantity of tin plate manufactured in America increased from 999 tons in 1891 to 74,260 tons in 1894, and thenceforward rose steadily to 712,147 tons in 1911.

The construction of sheet mills and rolling practice differ very little from current practice in Germany, except that the stands of the mills are set very wide apart, necessitating long driving shafts. An attempt has been made to introduce continuous mills, with the object of manufacturing on a large scale and dispensing with manual labor. A sheet mill on the Bray system was installed in 1906 by the American Sheet & Tinplate Company at South Sharon, but this is not a continuous mill in the true sense of the term, as a plate is never being rolled in two or more stands at the same time. Moreover, the plates, after rolling down in nine successive stands, are finished in sheet mills of the ordinary type.*

### Skelp Mills

Skelp is the intermediate product in the manufacture of welded tubes and in some respects resembles flat bars. But as it is thinner, and as much greater accuracy in width is required, the method of rolling differs. The stands of the continuous mills are not all arranged behind one another at regular intervals, but are set in groups which are driven separately for the most part. The grouping is not uniform, but differs in different mills. By dividing a mill into separate groups in this way a uniform width can be more accurately kept, it being impossible to use guides here, as is done in the bar mills, on account of the much higher speed of rolling, which is about twice that used in rolling bars. One of the final stands is provided with a pair of vertical rolls, which are intended to remove any inequalities in width; in one instance these vertical rolls were placed in front of the first stand, with the idea of removing any unevenness in the section of the billet at the start. The arrangement of the strip mill of the American Steel & Wire Company at Cuyahoga consisted of six continuous stands as a roughing train, following which were three double two-high stands. In these the bar is automatically guided from the lower to the upper pair of rolls. In the last three finishing stands a limited adjustment of the rolls is possible for skelp of different thicknesses, and a pair of vertical rolls is combined with one of the stands.

The roll diameter is very small in proportion to the large width and thinness of the strips, and does not admit of any great length of roll body; also, since the strips cannot conveniently be rolled in smooth or stepped rolls, the rolls must be grooved, and it is not possible to have many grooves in so short a length of roll body. In Germany tube strips are not yet rolled in continuous mills, though as a special product in large demand there is no reason why they should not.

The rolling operation is very rapid. At the National Tube Company's mill skelp 7 by 3/16 in. was rolled and finished from 4 x 6-in. billets in nine passes through the nine stands in 38 sec. The average reduction per pass is 27 per cent., which is to some extent facilitated by corrugating the bottom of the first few grooves.

To save planing the edges of strips intended for lap welding the last roll is so grooved that strips with beveled edges are obtained, thus avoiding the necessity of further machining. Only in the case of skelp for tubes over 14 in. in diameter are the edges beveled on the planing machine, everything below that size being beveled in the mill. The proportion of rejections of such strip is, however, fairly high, the loss of material between the ingot and the finished tube being 12 to 13 per cent.

### Method of Driving

In general, in the United States the steam engine has until lately been preferred for supplying the motive power to rolling mills, and at the present day the majority of mills are still driven by steam. Lately, however, electricity, which has long been used for driving the auxiliary machinery, has made great headway as an agent for driving the mills themselves. It has not yet been attempted to drive the mills with gas engines, whereas in Germany gas engines are already in use in many cases with considerable success. In the American works inspected it was noticeable that mills of different size and of various capacities were driven by steam engines of equal power, the reason being that, owing to the demand for quick delivery, engines of a standard size and type can be supplied at shorter notice than is the case when designing an engine to meet particular requirements.

From trails for determining the power requirements, it was found that the steam consumption in non-condensing engines averaged 600 lb., and in condensing engines about 400 lb. per ton of material rolled to eight times the original length. In Table VIII a comparison is made of the steam consumption of engines, which shows that the American engines are considerably the less economical in the case of reversing engines. With three-high mills, running in one direction only, the steam consumption is about the same.

Electric driving for rolling mills was comparatively late in being adopted in the United States, although electric auxiliary machinery was first used in American ironworks. As soon as the success of the first installations had been fairly proved, the change to electric driving proceeded rapidly and with characteristic energy. By the end of

*The Iron Age*, December 31, 1908, p. 1972.

1911, about 52 electric motors for driving rolling mills had altogether been built and installed. At the new Gary Works electric driving was adopted throughout, and the simplicity of the mill arrangement facilitated its introduction.

In general, alternating current is used for driving the larger motors and direct current for the smaller auxiliary motors. The direct-current motors receive their supplies from a motor generator driven by an alternating-current motor supplied from the central power station. Where two speeds are required in rolling, as in the Gary universal mill, a direct-coupled alternating-current induction motor with commutating poles is used, the commutation being effected by an auxiliary motor without interruption of the current. By this means it is possible in a total of 19 passes to double the speed between the ninth and tenth pass, and to drop again to the original speed between the nineteenth and the first pass. The speed variation is 40 to 80 r.p.m. but no data are available as to the durability of this arrangement.

The motors are almost exclusively alternating-current slip-ring motors; in a few instances they are arranged in cascade or with commutating poles or with short-circuit rotors. Short-circuit motors with additional rotor resistance are used for the finishing stands of the skelp mill at Cuyahoga, and are supplied from generators driven by three steam turbines. The consumption of power is said to amount to 50 kw-hr. per ton, though these figures do not appear to be very trustworthy. The average consumption per hour is given as 700 to 800 kw.

The size of the alternating current motors is 20 per cent. larger than that of the corresponding direct-current motors, and latterly they have been so constructed that the stator can be moved sideways along the main shaft so as to clear the rotor for repairs.

In some cases the exhaust steam of rolling mill engines is used for driving turbines for the generation of electric energy. At the Illinois Steel Company's works a turbine using both live and exhaust steam has lately been installed. It is supplied with steam from two reversing and two twin tandem engines. When driven with exhaust alone it develops 3000 kw. and with live steam 4000 kw.

At the works of the American Sheet & Tinplate Company, the blooming mill engine has attached to it a mixed steam turbine with a Rateau generator. The turbine is coupled direct to an 8-pole 1500 hp. direct-current dynamo of 250 volts, and with an output of 500 kw. it uses less than 18 kg. of steam per kilowatt hour at atmospheric pressure.

A Curtis exhaust steam turbine at the works of the National Tube Company, which was attached to the engine of the 36-in. reversing two-high blooming rolls, drove a 3000-kw. dynamo generating alternating current at 6600 volts and 35 cycles, running at 1500 r.p.m., but it burst in consequence of the high speed and the failure of the valve. Another Curtis mixed-steam turbine of 7000 kw. capacity, connected to rolling mill engines, was lately installed at the works of the Tennessee Coal, Iron & Railroad Company. The turbine is intended to work with live steam at 145-lb. pressure or exhaust steam at 16-lb. pressure.

It may be assumed that exhaust-steam turbines for the generation of electric energy have not found any greater favor in the United States than in Germany, and that results are being awaited before they are likely to become more widely adopted, especially as an adjunct to rolling mill engines. On account of the intermittent load the amount of waste steam fluctuates considerably, so that the output of the exhaust steam turbine can only be constantly maintained by using live steam, and it is questionable whether the economy of such an installation is greater than an ordinary condensing plant. Where, however, an exhaust turbine is connected to several rolling mill engines, especially to the non-reversing flywheel engines driving three-high mills, as at the works of the Illinois Steel Company and at the Tennessee Coal, Iron & Railroad Company, some economy might be achieved on account of the considerably lower consumption of live steam.

Since the end of 1910 the new plate rolling mill of the Calderbank Steelworks has been driven direct with a mixed steam turbine. This method of driving direct with a turbine was adopted after careful trials and calculations, which showed that a 13½ per cent. higher efficiency would be gained by direct driving than by interpolating an electric dynamo and motor. The anticipated results have been fully realized and it appears that a turbine is well adapted for driving rolling mills, on account of its comparatively high capacity for overloading. In the case of mixed steam turbines, however, the question of regulating presents some difficulties, which at Calderbank Steelworks have been overcome by using a heavy flywheel, which lessens the effect of the fluctuations in the load. This method of driving is likely to find adoption in Europe, especially in view of the economy in first cost by dispensing with the electric engines. The necessary train of gear wheels between the turbine and the rolls would present no technical difficulties at the present day. A description of this mill has already been published elsewhere.*

### American and European Practice Compared

Reviewing the rolling mill practice in America, and the peculiar characteristics of construction and arrangement which have been made with a view of obtaining the greatest possible output, it is unquestionable that the results aimed at have been fully achieved and must command the admiration of all practical iron manufacturers. But the creation of an iron industry on such a scale as that which has been achieved by the skill and foresight of the Americans is only possible given certain economic conditions. The organization necessary to enable manual labor to be dispensed with must be thorough and complete, and is dependent upon the condition of being able to manufacture on a large scale. This again is only possible where the market conditions are favorable. It is clear that special mills cannot be worked at a profit unless they can be run at their full capacity, as the experience of the past two or three years has shown, in the case of the Gary rail mill. In comparing German practice with American, and taking into consideration the difference in the economic conditions in the two countries, there is no reason to be dissatisfied with the present state of development of rolling mill practice in Germany.

The only feature which might, with advantage, be adopted in Europe is the continuous rolling mill, either in the form of the entirely continuous mill or of the continuous roughing mill. The entirely continuous mill can only be used for the same purpose as in America, that is, for rolling a very limited class of goods, such has billets, bars, wire rod or skelp. They would therefore be special mills, and their profitable use would be governed entirely by the market conditions and purposes for which the finished product was required. Such mills are quite suitable for German conditions, and some are already in operation, but they are quite impracticable for small sections which may be required in many shapes.

The economy of continuous mills as roughing trains for small and medium-sized sections depends upon market conditions only, that is, upon the class of goods rolled. This explains why certain mills built here in accordance with American practice have failed to fulfill the expectations of their builders, until the class of goods rolled was strictly limited to a few sections most in demand, thereby avoiding the frequent changing of rolls. Even then the advantages are only apparent, as the other trains become overloaded with the sections which the continuous roughing train cannot take.

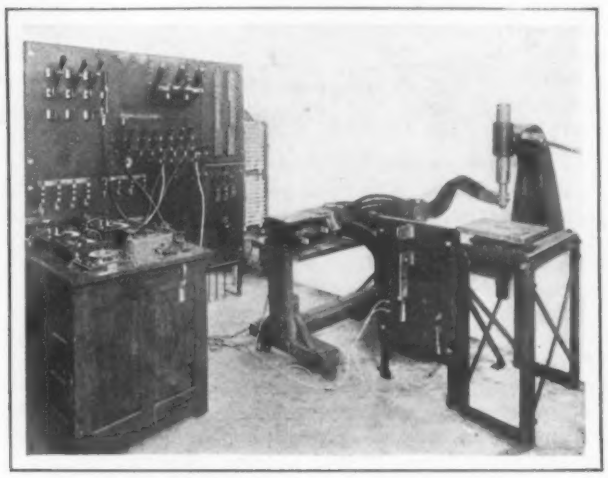
From what has been said, it is apparent that it would be out of the question to adapt American systems of rolling mills and rolling methods to European conditions, notwithstanding, of course, that many valuable object lessons may be learned from them. The lowering of the cost of production by allotting orders for certain classes of products to certain mills of a large company is a great advantage, since, under these circumstances, a whole works can be equipped for one or two particular classes of product. The founding of the United States Steel Corporation greatly facilitated this subdivision of rolling mill work, and it would undoubtedly be of great advantage to copy this practice in Europe.

In conclusion, the author has to express his most cordial thanks for the kind reception accorded to him and his friends everywhere in the United States. The utmost readiness was displayed in permitting him to visit and inspect the works, and all kinds of information and data were unreservedly placed at his disposal.

*The Iron Age, May 16, 1912, p. 1211.

## An Electrical Testing Laboratory

The Eveland Engineering & Mfg. Company, Philadelphia, has installed an electrical laboratory for testing practically all classes of electrical work, including alternating and direct-current apparatus, transformers, etc. The laboratory is also equipped with several electrical furnaces of various sizes and capacity, giving any desired



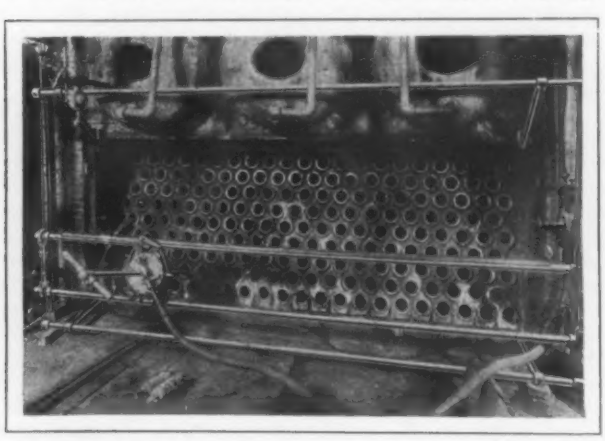
View in the Eveland Electrical Laboratory

range of temperature up to 2300 deg. F., with an equipment of pyrometers as well as three gas furnaces of different sizes for varied work connected with blowers, pyrometers, thermometers and regulating apparatus to cover a large class of work. There are also coal and coke forges for forming and shaping work for testing, etc., Some Riehlé weighing and testing machines have also been installed.

## Increasing Boiler Tube Cleaner Capacity

An interesting special arrangement of a motor-driven boiler tube cleaner is to be found in the power plant of the Colorado Springs & Interurban Railway Company, Colorado Springs, Col. The feed water at this point is exceptionally bad and a hard scale rapidly accumulates, which it was found was impossible to remove with the ordinary turbine or self-contained air-driven cleaner. To expedite boiler cleaning operations and to decrease the time that a given boiler is kept out of commission for cleaning purposes, it was found advisable to provide a special boiler cleaning attachment, such as is shown in the accompanying engraving.

A Weinland mechanical cutter head of the type illustrated in *The Iron Age*, May 23, 1912, is used for removing the scale and is driven by a Lagonda external steam motor. The equipment was designed and installed by one of the engineers of the Lagonda Mfg. Company, Springfield, Ohio, and the motor is designed so that the square shaft carrying the cutter head can pass directly through the motor and, while revolving at a high speed, can be worked back and forth in the boiler tubes, the motor remaining stationary upon the supporting frame. This motor is supported between rollers at the top and the bottom and is given a horizontal motion on the two supporting bars by the small handle shown at the top of the motor, which turns a pinion meshing with a rack on the top supporting bar. For shifting the motor vertically, the two horizontal bars are elevated by pinions meshing with vertical racks, these pinions being operated by a crank handle at the right. Pawls hold both pinions in place, so that after the motor has been adjusted in front of the tube, it remains stationary until all the scale has been removed.

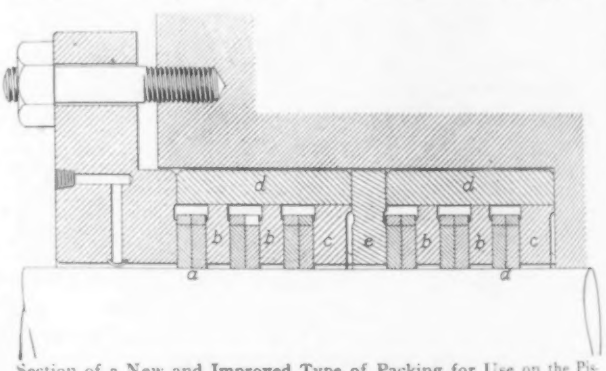


A View of the Special Arrangement Used for Supporting a Motor-Driven Boiler Tube Cleaner so as to Increase Its Capacity

The shaft supporting the cutter head is sectional and additional lengths are added as the cleaner is worked into the tubes, the handle being attached to the shaft by a swivel joint. The motor can be driven by either air, steam or water pressure and with steam at 100-lb. pressure, it will develop 7 hp.

## An Improved Type of Packing for Gas Engines

A new packing has been devised by James Horton, efficiency engineer of the Homestead plant of the Carnegie Steel Company, for the piston rods of double-acting gas engines, such as are now in common use in large plants. This packing, which is being made to the inventor's design and formula by the Metallic Packing & Mfg. Company, Elyria, Ohio, is used in the manner indicated in the accompanying drawing. The packing rings proper *a*, which are shown in contact with the rod, are placed in grooves. The walls of these grooves *b* and *c* have a slight lateral movement in line with the rod, and thus bind segmental packing rings *a* sidewise against forcible inward closure during the compression, working and exhaust stroke pressure in the cylinders. It is emphasized that in practice it has been found that this side clamping of the ring does not affect the sealing quality of the packing, since the contact with the rod is always sufficient to prevent passage of gases and is yet very light. Some of the original packing has been in service for over two years on a large engine under trying conditions, and it is stated that at the present time, no wear can be detected on the rod.




Section of a New and Improved Type of Packing for Use on the Piston Rods of Double-Acting Gas Engines Showing the Arrangement of the Various Parts

The packing, as a whole, consists of the segmental packing rings *a*, a partition between them, *b*, and a clamping or pressure ring, *c*. These two parts are turned to a working fit within the ring *a*, which is a plain, cylindrical filler ring and *e* is a ring dividing the packing box into two compartments.

The working principle of the packing is that the pressure which accumulates in the cylinder enters the groove in the face of the ring *c* and forces it together with *b* and the intervening packing rings *a* hard against the division ring *e*, thus binding the packing rings proper sidewise. In this way the pressure which may accumulate in the space around the outer diameter of the segmental rings *a*, tending to force them hard against the piston rod, is offset, thus, it is emphasized, preventing excessive wear of both the packing and the rods.

Another advantage of the packing is that all the rings and all corresponding parts are interchangeable with another, which adds to the simplicity, ease of handling and economy of operation.

Due to the rapid increase in the demand for high vacuum condensing apparatus and Rotrex air pumps, the C. H. Wheeler Mfg. Company, Lehigh avenue and Eighteenth street, Philadelphia, is making extensive enlargements and improvements to its works. The capital stock has been increased from $200,000 to $600,000.

# Meeting of the Iron and Steel Institute

## The Talbot Sound Ingot Process, a New Electric Reversing Mill, Cold Drawing, Dry Blast and Furnace Regenerators Discussed

Some adverse experiences with the Talbot method of producing sound steel ingots were reported in the annual meeting of the Iron and Steel Institute, held in London May 1 and 2. There were also active discussions on the cold flow of steel in drawing, on economies in the use of dried air for the blast furnace, on the operation of regenerators in open-hearth furnaces, on a new two-high reversing mill direct driven by a continuously running electric motor and on some contributions dealing with metallography. The meeting was held in the headquarters of the Institution of Mechanical Engineers, with President Arthur Cooper, LL.D., Northeastern Steel Company, Ltd., Middlesbrough, occupying the chair.

### Talbot Method of Producing Sound Steel Ingots

The paper by Benjamin Talbot gave some further experiences with the process to those already presented in these columns, showed the general mill arrangements to accommodate the operations and included an extensive series of drop tests of rails rolled from Talbot treated ingots. The discussion was opened by Sir Robert Hadfield, who drew attention to a statement in Mr. Talbot's paper, that "the ingot is preferably treated with a deoxidizer, such as aluminum, in order to create a piping steel with no blowholes in the outer area." He objected to the term "outer area" because it seemed to him that the use of solidifiers referred not only to the outer area, but to the whole mass of fluid steel, and a wrong impression might be obtained from the use of such an expression. He asked whether the author had observed carefully the casting temperature of the steel. An average steel would vary considerably in temperature. Variations of perhaps 40 or 50 deg. C. might not seem very much, but might, nevertheless, considerably affect the final qualities of the steel. The author, he added, had dealt chiefly with steel containing not more than 0.03 per cent. phosphorus. In other countries steel was used for rails in which this percentage was much higher than the lower limits to which Mr. Talbot referred, and he would like to know what would be the effect of adopting Mr. Talbot's process upon steel with a higher percentage—say, 0.06. He was somewhat afraid that this distribution of segregation might, with this percentage of phosphorus, give a steel which was not altogether quite sound.

It was often possible, he added, to get certain tensile tests which showed excellent results when the steel was tested in the ordinary longitudinal test bar, but with transverse tests the weakness of the steel was shown up. Those who produced gun-steel knew that the tensile strength taken longitudinally did not always represent the value of the material taken transversely. He further asked if Mr. Talbot had followed up his researches to the complete destruction of rails. So far as Mr. Talbot's method was concerned, he naturally preferred his own, because it seemed to him that the method of feeding the ingot from the top to a large extent affected the segregation, and the more it was possible to feed the steel and keep the top hot, the greater was the reduction in segregation. His works had experienced for a further six months since he first described his own method, and had made many thousands of tons by that method, and the results, which he placed before the Institute last autumn, had in every way been borne out in actual practice.

Hugh Savage, Seraing, Belgium, presented the outcome of research work undertaken in the rail mill of the Cockerill works, Seraing, by the engineer-in-charge, Mr. Houbaer. In the manufacture of rails they used ordinary cast-iron ingot molds, and found it simply impossible to utilize the Hadfield process with them. In spite of all attempts to keep it liquid by means of burning charcoal, the top of the ingot solidified within 20 to 25 minutes after casting. The pipe attained about the usual dimensions, and the slag spread over the surface of the liquid steel was actually sucked into the cavity, making matters, in fact, worse. To obtain the full benefit of the process the ingot head must remain liquid until the body had become completely solid. This, in the case of an 18-in. ingot, would require at least an hour, one consequence of which was that soaking pits of the ordinary type would have to be replaced by specially heated pits. A second requirement would be a very much enlarged casting pit, capable of holding the ingots from five or six casts. All this amounted to saying that, if they were to profit by the undoubted advantages of the Hadfield method their converter house and ingot handling arrangements must be remodeled. They might be fairly entitled to demand whether the advantage gained would be a full compensation for so heavy an outlay.

Turning now to Mr. Talbot's proposals, there was no longer any question of modifying plants. The suggestion was that they should utilize their existing appliances in such a manner as to enable them to produce more reliable rails. The superiority of these new rails was a consequence of the suppression of the pipe or shrinkage cavity in the ingot. Another result of Mr. Talbot's method of rolling was the presence in the finished rails of a central core of soft steel, around which the segregated metal was distributed in a layer of fairly uniform thickness, forming, so to say, a kind of weld between the soft core and the harder outside. The peculiar form of segregation thus obtained was supposed to be without influence on the strength of the rail, while the absence of piping should have the effect of reducing brittleness. This claim of reduced brittleness was not borne out by certain experiments made in the rail mills at Seraing.

The figures shown represented sections through the top and middle part of blooms 8 in. square, rolled from ingots 20½ in. square, left 30 minutes in the soaking pits. One of these was rolled down at once to its final dimensions. Its sections displayed in a marked degree the peculiar segregation of ingots prematurely bloomed. The second bloom, after a few passes through the rolls, bringing down its section to 16 in. square, was returned to the pits for one hour, and afterward reduced to its final section. In this case, which represented, it was believed, Mr. Talbot's practice, the segregation, although considerably attenuated, still existed. In rails manufactured by this method the "pipe" was no doubt got rid of, but the main point to observe appeared to be that, whereas, in ordinary practice, an insufficiently cropped ingot might give one or perhaps two rails out of six or seven in which the effect of the pipe might be perceptible, with Mr. Talbot's process the special kind of segregations obtained was present in almost every rail.

The trials were made on four different casts of rail steel containing about 0.45 per cent. carbon. In each cast one ingot was rolled according to Mr. Talbot's specification; a second one before being completely solidified but without being returned to the pits; while a third ingot was allowed to solidify in the pit, and was then bloomed in accordance with usual practice. These three ingots were rolled into rails without any appreciable cropping at the head; and for testing, lengths were taken from the ends of the rails corresponding to the tops of the ingots. In the tests themselves, in order to obtain better comparative results—results of a nature fully to bring out the difference of quality in the final product due to different methods of manufacture—they used a modified test—viz., a weight of one ton falling from a height of 13 ft. By so doing they reduced the impact caused by the usual drop test, and were thus able to repeat the blow a certain number of times, according to the resisting properties of each individual rail. A test of this kind was more instructive than the simple carrying out of the standard drop test, as described by Mr. Talbot, in his paper, which in no wise complied with the programme, where a comparative test was plainly hinted at. Under their drop tests the Talbot rails gave indifferent results; those rolled by the second process showed better resisting qualities, while the

rails obtained from ingots treated in the usual manner gave, under the same conditions, very good results.

In conclusion, it was suggested that in the question of rail-breakages it seemed customary to consider only the possibilities of defective material. The presence of piping in ingots, of folds or flaws in finished rails, were evident causes to which it was only too natural to ascribe all the accidents observed. But, as a fact, there were many other causes why rails should break; such as badly laid and badly maintained road-beds, defective fastenings, interior ties, etc., with which the railmaker has no concern, and for the effects of which he should not be held responsible.

R. G. Scott, Monk Bridge Iron Works, Leeds, said it was very curious to find that the ingots which Mr. Talbot had compressed quickly seemed to have solidified in a different way from those compressed by the Harmet process. It was now some time since this process was introduced into this country, and it did not seem to have been taken up very much here, but the compression of the steel in the Harmet ingot was carried out in a most methodical and scientific way. They followed the compression continuously, and gave the compression as a value on a curve which was carried on a rotating drum. That curve was elaborated from experience in order to counteract exactly the contraction that was taking place in the ingot, with the result that the steel was afterward kept up to a level at the top of the ingot and no piping was ever formed. In fact, piping was not allowed to form. A large number of these ingots had been sliced up the middle and planed down to the exact center line where any segregation was most likely to show itself. He did not think that any ingots made in the Harmet process had ever shown a line of demarcation or a line of segregation such as Mr. Talbot had found in his ingots.

F. W. Harbord when he heard that Mr. Talbot was carrying out the experiments asked for a few sections of ingots—transverse sections—as he wanted to try and trace the flow of the segregate from the center toward the outside. He had been supplied with ingots cast with and without aluminum, and the results of the squeezing seemed to show, as far as the ingot was concerned, that it was necessary, in order to get a sound outside, to use a deoxidizing agent. Mr. Talbot had also supplied him with two or three rails from ingots cast with aluminum, and on etching these it had occurred to him that probably the weakest portion would be in the web, because in the web there was a great deal of the segregation line close to the surface. He, therefore, had the web cut out and a transverse bending test made. The rail was bent to an angle of 51 deg. and the carbon was 0.71, which was a fair test for a high-carbon steel of that kind. In this particular rail the segregation was very clearly marked. The actual carbon in the center was 0.56, and on the line of segregation it was 0.75. The line of segregation, as already mentioned, was fairly marked, but at the same time it passed away gradually, and there was no distinct parting. It was very distinctly seen under the microscope how the ferrite increased toward the center portion, but there was no sharp line of demarcation. The sulphur had also segregated very considerably, it being 0.075 on the outside and 0.029 in the center.

J. M. Gledhill, Sir W. G. Armstrong, Whitworth & Co., Manchester, said the application of pressure to fluid steel on ingots of very large dimensions had been discussed by the late Sir Joseph Whitworth as far back as forty years ago, and, ever since the initial stages of compressed steel, his firm had continued to carry out the process of compression upon all their ingots. These ingots were from 25 to 30 tons weight, so that it was rather interesting to him to see from this paper that the author was dealing with ingots of a totally different weight. He believed Mr. Talbot was distinctly on the right track. The greatest possible trouble arose from the different temperatures of casting steel.

E. H. Saniter referred to the liberation of nitrogen by aluminum mentioned in the paper. It seemed to him that if aluminum disengaged gas from the steel, it was more likely to make blowholes than to make solid steel, and this rather contradicted Mr. Talbot's idea.

Mr. Talbot, in reply, first dealt with the casting temperature in the ladle. He had tried the use of a pyrometer in pouring liquid steel, but the results were very unsatisfactory and could not be relied upon. The temperature that he took was the practical temperature that it took to cast the ingots clean. In the reference to high phosphorus steel, he presumed they were speaking more particularly of phosphorus in American steel, which, in the last year or two, was for Bessemer steel, 0.10. He thought that day was over, however, because they had only to see the records now of the rail trade in America to see that it was going over as quickly as it could to the basic open-hearth process. If they took 0.10 phosphorus steel it was necessary to segregate higher, but it would be no worse, and perhaps not so bad, as to-day, because there was not the same variation. We had it under control, and to-day the Americans had not. The question of transverse tests, he believed, Dr. Stead had in hand, as he was doing what he pleased with some rails and some transverse tests had been made.

He had not had the time to study the tests spoken of at Seraing, but he did not think that Cockerill's had followed exactly what he would have recommended if they had spoken to him first. To begin with, he thought the weight and size of the Cockerill ingots were altogether too small. To secure scientific results there must be uniform conditions to start with, and that involved a certain size. He had started on a size of ingot which did the work. It was difficult to do it even with a 4-ton ingot, but if he had used a 2 or 1½-ton ingot he would probably not have succeeded. The point was to start with a size which gave good results, and to work down. He knew it was possible to work up. The question of the critical time-period was important. He knew that even when using a blooming mill, which was not the machine he would use eventually, there was possibly 20 minutes in which to treat a particular ingot, and get the required structure and the solid formation. With an ingot possibly down to 1½ tons he would not have sufficient time, so he was at present working on a size which was entirely commercial and from which he hoped to get results.

Mr. Scott and Mr. Gledhill were both representatives of the compression process—one the Harmet, and the other the old Whitworth—and it would be interesting if these gentlemen would give sulphur prints of one of their ingots planed down the center. He proposed to make a standard ingot of one size, and he would suit his blooming-mill arrangements accordingly, and take the weight from the blooming mill for the various mills, and not make various sized ingots. To get this result he would establish a standard ingot in the shop, whatever that size might be. With reference to the squeezer, it would not be a blooming mill, but a special machine adapted for the purpose. That was the question that he must satisfy himself about before he went into it commercially—viz., what this structure really meant, and, of course, it only applied to the top third of the ingot. If there was any objection to the structure to-day, he did not think there would be when people thoroughly understood it.

### A New Two-High Reversing Mill

The next paper read was "On a New Form of Electrically Driven Two-high Continuous Running Reversing Mill," by Andrew Lamberton, Sunnyside Engine Works, Coatbridge, Scotland. The paper is printed elsewhere in this issue. Henry Crowe congratulated the author on the production of such an ingenious machine, but thought that a period of 3 to 5 sec. for reversing was a very long time for reversing a rolling mill. It might do for a blooming mill working slowly, but it would not do in ordinary practice to take anything like that time to reverse. A second or less was more like the proper time. He thought there would be a great deal of trouble with the guides in the machine. He agreed with the author that the small output of our English mills was due to the fact that one mill had to cater for so many different sections, which resulted in the necessity for a lot of roll changing and a lot of idle time. With regard to the continuous-running motor, he thought this would be a disadvantage in many mills, because, from the practical point of view, it was a great advantage to be able to stop the machine when required, and also to run at any desired speed.

Mr. Lamberton said he had not seen the new mills at Skinningrove, for the design of which Mr. Crowe had been responsible, but he was prepared to wager that those mills would not reverse regularly in 3 sec. They might do so now and again, but if they did it continuously, Mr.

Crowe was doing better than anybody else in Great Britain. The time taken to reverse the gear and make the adjustment was usually very considerable over 3 sec., and he was not at all disturbed with regard to this. If his mill did this work in 3 sec. he would be quite satisfied. The mill was designed to turn out 45 to 50 tons per hour, and this could be done comfortably with a turnover in every 3 secs., and with three 8-in. mills he would get 5000 tons a week at the cost of about half that of an electrically-driven mill on the other system. He confessed that the guides gave him some trouble at first, but the problem was working itself out all right in practice.

### Cold Flow of Steel in Drawing

A paper entitled "Studies in the Cold Flow of Steel" was presented by Percy Longmuir. Dr. Frank Rogers, Sheffield, asked a question in connection with the flow of steel through dies in wire drawing. For example, with a 0.70 carbon wire, did the author think it was best, when all was considered, that the condition of the wire before drawing should be entirely sorbitic, i.e. 0.70 carbon plus sorbite, or sorbite plus ferrite, i.e. 0.90 carbon plus ferrite, or ferrite plus more or less laminated pearlite. Some higher power photos of the wires would, he asserted, have shown better the ultimate effect of the drawing on the structure. Mr. Longmuir seemed to have established, he added, that cementite does not flow. One would have expected that, but at times doubtless the cohesion between sorbite or pearlite on the one hand and cementite on the other would be destroyed, and further, cementite plates themselves must undoubtedly sometimes elongate. One would not expect to get very great elongation from such very hard wire, but taking one with more than 0.90 carbon he asked whether Mr. Longmuir considered that the conditions and the immediate stages of drawing were most favorable if what was drawn can be formed of cementite plus sorbite or cementite plus pearlite or sorbite. It was interesting to note that the ideal conditions of breaking steel or any other metal were by compression and not by tension.

Dr. Walter Rosenhain, National Physical Laboratory, Teddington, said that the chief difficulty to account for the deformations which occur arises chiefly from the fact that the deformation was extremely local. When stretching a test piece under tension the deformations go on uniformly for a time throughout a considerable length, and the various crystals have time to adjust themselves to the conditions without being very largely distorted or broken up. When steel is passed through a hole in the draw-plate, even if the draft is very small, as in the experiments, the external crystals have to adjust themselves very rapidly, and it has been shown repeatedly that, when the change of shape is local and occurs over a region which is comparable in size with the size of the crystal itself, it is difficult for the crystal to adjust itself to the new shape by the process of slipping along. If one takes a crystal and bends it, it is possible to see how the orientation of the various parts of the crystal are altered, and something else than crystalline slip has to occur; and some of Mr. Longmuir's results are due to the fact that something of that sort accompanies slip in the case of wire-drawing. Dr. Rosenhain thought that is largely explained by the idea that the crystalline structure is broken down to a temporarily mobile form, which afterward retains the amorphous condition.

Mr. Longmuir said Dr. Rogers had raised an extremely interesting question in regard to the most suitable constitutional condition for drawing, and he thought it would be appreciated when he said that this question had better be replied to in writing fully; but, speaking generally, a drawer would prefer ferrite and sorbite or cementite plus sorbite. That, of course, was speaking very generally. The analysis of the stresses in drawing was of very considerable interest, but much further work was necessary before definite opinions could be formed. Nevertheless, he thought that Dr. Rogers had most clearly shown that wire-drawing was not necessarily a stretching effect, but rather an effect of cross-compression.

Dr. Rosenhain, he continued, had also raised several interesting points, and particularly in regard to the relatively rapid readjustment of the skin crystals which have been locally distorted on passing through the die. Sometimes a wire was occasionally larger after it came out of the die. At the Stocksbridge works this had been studied, and another explanation of the point might be found in bad lubrication, giving rise to excessive temperature—that was to say, excessive as regards wire-drawing, which in turn slightly expanded the whole.

### Economy of Dry Blast

The next paper was "The Economy of Dry Blast," by Professor Ehrenworth, Montanistische Hochschule, Leoben, Austria. Greville Jones, Clarence Iron Works, Middlesbrough, agreed with the author with regard to the advisability for dry air for blast furnace working for ferromanganese and ferrosilicon, where the annual consumption was particularly high. This, however, necessitated so much more air compared with the ordinary system of manufacture of pig iron and blast furnace iron, that some cheap method of drying the air was necessary.

A. K. Rees, Cargo Fleet Iron Company, said he could confirm the point that the economic advantage of drying the blast was greater the lower the temperature of the blast and the higher temperautre of the waste gases. He believed it was well known to all blast furnace men that every blast furnace had what might be called a maximum permissible blast temperature which varied with the design of the furnace and with the materials worked. In all probability, this maximum permissible temperature was due to the variation in the moisture in the blast.

The variation of temperature in the furnace had the effect, he added, of varying the location of the melting zone, but this constant alteration up and down of the melting zone in the furnace tended to cause irregular motion of the stock. With the introduction of dry air, this irregularity was removed, and there was obtained a more definite location for the melting zone. For this reason dry-blast led to an improvement in the composition of the pig iron. The fact that this very important variable was removed meant that the maximum permissible temperature could be raised very considerably, and, therefore, in order to obtain the greatest advantage from the use of dry-blast, it was necessary to increase the blast temperature as high as the furnace would stand. His experience was that this was a great deal higher than the maximum permissible temperature with natural air. Nobody would call a blast furnace plant properly equipped unless it had a heating capacity which would give this maximum blast temperature. If it had not a heating capacity sufficient for this, then it was a badly equipped furnace plant, and, if dry-blast was introduced and provision not made for the heating capacity to give the increased maximum permissible blast temperature, then they were not getting the best advantage from the dry-blast. With a furnace of 1250 deg. F., with natural air as a maximum permissible temperature, if this were raised to 1500 or 1600 deg. F. with dry air, then obviously some means must be provided for obtaining that higher temperature, because the only sensible limit to the degree of temperature used with the natural air was the ability to use it in the furnace satisfactorily. Therefore, the most important factor in connection with dry-blast was a maximum blast temperature.

T. C. Hutchinson said that some years ago he went very carefully into the economy of adopting the principle advised by Mr. Gayley, and he obtained an estimate of the cost of installing it at his works, but the amount of the tender, for supplying the apparatus necessary to dry the air for his five furnaces, was close upon $350,000. He calculated that it would take twelve years, with interest at 5 per cent., to overcome the original expenditure, and he came to the conclusion that he could put his money to better advantage, and consequently he did not accept the scheme. He had not heard anything yet that convinced him that it was economical to dry the air for the blast furnaces, at any rate in the Cleveland district.

Mr. Rees, speaking with regard to the greater amount of moisture in the United States, said that the maximum moisture in the blast at his furnaces with natural air was 4 to 4¾ grains per cubic foot, and this had been reduced by drying the air to 1 to 1¼ grains per cubic foot. In the United States the moisture amounted to as much as 11 grains per cubic foot, but this had also been reduced to 1½ to 1¾. Thus, in spite of the enormous difference in the amount of moisture, there had been a larger percentage of reduction; in other words, the improvement was not in proportion to the actual amount of moisture removed from the blast, and it was clear from these figures that

rails obtained from ingots treated in the usual manner gave, under the same conditions, very good results.

In conclusion, it was suggested that in the question of rail-breakages it seemed customary to consider only the possibilities of defective material. The presence of piping in ingots, of folds or flaws in finished rails, were evident causes to which it was only too natural to ascribe all the accidents observed. But, as a fact, there were many other causes why rails should break; such as badly laid and badly maintained road-beds, defective fastenings, interior ties, etc., with which the railmaker has no concern, and for the effects of which he should not be held responsible.

R. G. Scott, Monk Bridge Iron Works, Leeds, said it was very curious to find that the ingots which Mr. Talbot had compressed quickly seemed to have solidified in a different way from those compressed by the Harmet process. It was now some time since this process was introduced into this country, and it did not seem to have been taken up very much here, but the compression of the steel in the Harmet ingot was carried out in a most methodical and scientific way. They followed the compression continuously, and gave the compression as a value on a curve which was carried on a rotating drum. That curve was elaborated from experience in order to counteract exactly the contraction that was taking place in the ingot, with the result that the steel was afterward kept up to a level at the top of the ingot and no piping was ever formed. In fact, piping was not allowed to form. A large number of these ingots had been sliced up the middle and planed down to the exact center line where any segregation was most likely to show itself. He did not think that any ingots made in the Harmet process had ever shown a line of demarcation or a line of segregation such as Mr. Talbot had found in his ingots.

F. W. Harbord when he heard that Mr. Talbot was carrying out the experiments asked for a few sections of ingots—transverse sections—as he wanted to try and trace the flow of the segregate from the center toward the outside. He had been supplied with ingots cast with and without aluminum, and the results of the squeezing seemed to show, as far as the ingot was concerned, that it was necessary, in order to get a sound outside, to use a deoxidizing agent. Mr. Talbot had also supplied him with two or three rails from ingots cast with aluminum, and on etching these it had occurred to him that probably the weakest portion would be in the web, because in the web there was a great deal of the segregation line close to the surface. He, therefore, had the web cut out and a transverse bending test made. The rail was bent to an angle of 51 deg. and the carbon was 0.71, which was a fair test for a high-carbon steel of that kind. In this particular rail the segregation was very clearly marked. The actual carbon in the center was 0.56, and on the line of segregation it was 0.75. The line of segregation, as already mentioned, was fairly marked, but at the same time it passed away gradually, and there was no distinct parting. It was very distinctly seen under the microscope how the ferrite increased toward the center portion, but there was no sharp line of demarcation. The sulphur had also segregated very considerably, it being 0.075 on the outside and 0.029 in the center.

J. M. Gledhill, Sir W. G. Armstrong, Whitworth & Co., Manchester, said the application of pressure to fluid steel on ingots of very large dimensions had been discussed by the late Sir Joseph Whitworth as far back as forty years ago, and, ever since the initial stages of compressed steel, his firm had continued to carry out the process of compression upon all their ingots. These ingots were from 25 to 30 tons weight, so that it was rather interesting to him to see from this paper that the author was dealing with ingots of a totally different weight. He believed Mr. Talbot was distinctly on the right track. The greatest possible trouble arose from the different temperatures of casting steel.

E. H. Saniter referred to the liberation of nitrogen by aluminum mentioned in the paper. It seemed to him that if aluminum disengaged gas from the steel, it was more likely to make blowholes than to make solid steel, and this rather contradicted Mr. Talbot's idea.

Mr. Talbot, in reply, first dealt with the casting temperature in the ladle. He had tried the use of a pyrometer in pouring liquid steel, but the results were very unsatisfactory and could not be relied upon. The temperature that he took was the practical temperature that it took to cast the ingots clean. In the reference to high phosphorus steel, he presumed they were speaking more particularly of phosphorus in American steel, which, in the last year or two, was for Bessemer steel, 0.10. He thought that day was over, however, because they had only to see the records now of the rail trade in America to see that it was going over as quickly as it could to the basic open-hearth process. If they took 0.10 phosphorus steel it was necessary to segregate higher, but it would be no worse, and perhaps not so bad, as to-day, because there was not the same variation. We had it under control, and to-day the Americans had not. The question of transverse tests, he believed, Dr. Stead had in hand, as he was doing what he pleased with some rails and some transverse tests had been made.

He had not had the time to study the tests spoken of at Seraing, but he did not think that Cockerill's had followed exactly what he would have recommended if they had spoken to him first. To begin with, he thought the weight and size of the Cockerill ingots were altogether too small. To secure scientific results there must be uniform conditions to start with, and that involved a certain size. He had started on a size of ingot which did the work. It was difficult to do it even with a 4-ton ingot, but if he had used a 2 or 1½-ton ingot he would probably not have succeeded. The point was to start with a size which gave good results, and to work down. He knew it was possible to work up. The question of the critical time-period was important. He knew that even when using a blooming mill, which was not the machine he would use eventually, there was possibly 20 minutes in which to treat a particular ingot, and get the required structure and the solid formation. With an ingot possibly down to 1½ tons he would not have sufficient time, so he was at present working on a size which was entirely commercial and from which he hoped to get results.

Mr. Scott and Mr. Gledhill were both representatives of the compression process—one the Harmet, and the other the old Whitworth—and it would be interesting if these gentlemen would give sulphur prints of one of their ingots planed down the center. He proposed to make a standard ingot of one size, and he would suit his blooming-mill arrangements accordingly, and take the weight from the blooming mill for the various mills, and not make various sized ingots. To get this result he would establish a standard ingot in the shop, whatever that size might be. With reference to the squeezer, it would not be a blooming mill, but a special machine adapted for the purpose. That was the question that he must satisfy himself about before he went into it commercially—viz., what this structure really meant, and, of course, it only applied to the top third of the ingot. If there was any objection to the structure to-day, he did not think there would be when people thoroughly understood it.

### A New Two-High Reversing Mill

The next paper read was "On a New Form of Electrically Driven Two-high Continuous Running Reversing Mill," by Andrew Lamberton, Sunnyside Engine Works, Coatbridge, Scotland. The paper is printed elsewhere in this issue. Henry Crowe congratulated the author on the production of such an ingenious machine, but thought that a period of 3 to 5 sec. for reversing was a very long time for reversing a rolling mill. It might do for a blooming mill working slowly, but it would not do in ordinary practice to take anything like that time to reverse. A second or less was more like the proper time. He thought there would be a great deal of trouble with the guides in the machine. He agreed with the author that the small output of our English mills was due to the fact that one mill had to cater for so many different sections, which resulted in the necessity for a lot of roll changing and a lot of idle time. With regard to the continuous-running motor, he thought this would be a disadvantage in many mills, because, from the practical point of view, it was a great advantage to be able to stop the machine when required, and also to run at any desired speed.

Mr. Lamberton said he had not seen the new mills at Skinningrove, for the design of which Mr. Crowe had been responsible, but he was prepared to wager that those mills would not reverse regularly in 3 sec. They might do so now and again, but if they did it continuously, Mr.

Crowe was doing better than anybody else in Great Britain. The time taken to reverse the gear and make the adjustment was usually very considerable over 3 sec., and he was not at all disturbed with regard to this. If his mill did this work in 3 sec. he would be quite satisfied. The mill was designed to turn out 45 to 50 tons per hour, and this could be done comfortably with a turnover in every 3 secs., and with three 8-in. mills he would get 5000 tons a week at the cost of about half that of an electrically-driven mill on the other system. He confessed that the guides gave him some trouble at first, but the problem was working itself out all right in practice.

### Cold Flow of Steel in Drawing

A paper entitled "Studies in the Cold Flow of Steel" was presented by Percy Longmuir. Dr. Frank Rogers, Sheffield, asked a question in connection with the flow of steel through dies in wire drawing. For example, with a 0.70 carbon wire, did the author think it was best, when all was considered, that the condition of the wire before drawing should be entirely sorbitic, i.e. 0.70 carbon plus sorbite, or sorbite plus ferrite, i.e. 0.90 carbon plus ferrite, or ferrite plus more or less laminated pearlite. Some higher power photos of the wires would, he asserted, have shown better the ultimate effect of the drawing on the structure. Mr. Longmuir seemed to have established, he added, that cementite does not flow. One would have expected that, but at times doubtless the cohesion between sorbite or pearlite on the one hand and cementite on the other would be destroyed, and further, cementite plates themselves must undoubtedly sometimes elongate. One would not expect to get very great elongation from such very hard wire, but taking one with more than 0.90 carbon he asked whether Mr. Longmuir considered that the conditions and the immediate stages of drawing were most favorable if what was drawn can be formed of cementite plus sorbite or cementite plus pearlite or sorbite. It was interesting to note that the ideal conditions of breaking steel or any other metal were by compression and not by tension.

Dr. Walter Rosenhain, National Physical Laboratory, Teddington, said that the chief difficulty to account for the deformations which occur arises chiefly from the fact that the deformation was extremely local. When stretching a test piece under tension the deformations go on uniformly for a time throughout a considerable length, and the various crystals have time to adjust themselves to the conditions without being very largely distorted or broken up. When steel is passed through a hole in the draw-plate, even if the draft is very small, as in the experiments, the external crystals have to adjust themselves very rapidly, and it has been shown repeatedly that, when the change of shape is local and occurs over a region which is comparable in size with the size of the crystal itself, it is difficult for the crystal to adjust itself to the new shape by the process of slipping along. If one takes a crystal and bends it, it is possible to see how the orientation of the various parts of the crystal are altered, and something else than crystalline slip has to occur; and some of Mr. Longmuir's results are due to the fact that something of that sort accompanies slip in the case of wire-drawing. Dr. Rosenhain thought that is largely explained by the idea that the crystalline structure is broken down to a temporarily mobile form, which afterward retains the amorphous condition.

Mr. Longmuir said Dr. Rogers had raised an extremely interesting question in regard to the most suitable constitutional condition for drawing, and he thought it would be appreciated when he said that this question had better be replied to in writing fully; but, speaking generally, a drawer would prefer ferrite and sorbite or cementite plus sorbite. That, of course, was speaking very generally. The analysis of the stresses in drawing was of very considerable interest, but much further work was necessary before definite opinions could be formed. Nevertheless, he thought that Dr. Rogers had most clearly shown that wire-drawing was not necessarily a stretching effect, but rather an effect of cross-compression.

Dr. Rosenhain, he continued, had also raised several interesting points, and particularly in regard to the relatively rapid readjustment of the skin crystals which have been locally distorted on passing through the die. Sometimes a wire was occasionally larger after it came out of the die. At the Stocksbridge works this had been studied, and another explanation of the point might be found in bad lubrication, giving rise to excessive temperature—that was to say, excessive as regards wire-drawing, which in turn slightly expanded the whole.

### Economy of Dry Blast

The next paper was "The Economy of Dry Blast," by Professor Ehrenworth, Montanistische Hochschule, Leoben, Austria. Greville Jones, Clarence Iron Works, Middlesbrough, agreed with the author with regard to the advisability for dry air for blast furnace working for ferromanganese and ferrosilicon, where the annual consumption was particularly high. This, however, necessitated so much more air compared with the ordinary system of manufacture of pig iron and blast furnace iron, that some cheap method of drying the air was necessary.

A. K. Rees, Cargo Fleet Iron Company, said he could confirm the point that the economic advantage of drying the blast was greater the lower the temperature of the blast and the higher temperautre of the waste gases. He believed it was well known to all blast furnace men that every blast furnace had what might be called a maximum permissible blast temperature which varied with the design of the furnace and with the materials worked. In all probability, this maximum permissible temperature was due to the variation in the moisture in the blast.

The variation of temperature in the furnace had the effect, he added, of varying the location of the melting zone, but this constant alteration up and down of the melting zone in the furnace tended to cause irregular motion of the stock. With the introduction of dry air, this irregularity was removed, and there was obtained a more definite location for the melting zone. For this reason dry-blast led to an improvement in the composition of the pig iron. The fact that this very important variable was removed meant that the maximum permissible temperature could be raised very considerably, and, therefore, in order to obtain the greatest advantage from the use of dry-blast, it was necessary to increase the blast temperature as high as the furnace would stand. His experience was that this was a great deal higher than the maximum permissible temperature with natural air. Nobody would call a blast furnace plant properly equipped unless it had a heating capacity which would give this maximum blast temperature. If it had not a heating capacity sufficient for this, then it was a badly equipped furnace plant, and, if dry-blast was introduced and provision not made for the heating capacity to give the increased maximum permissible blast temperature, then they were not getting the best advantage from the dry-blast. With a furnace of 1250 deg. F., with natural air as a maximum permissible temperature, if this were raised to 1500 or 1600 deg. F. with dry air, then obviously some means must be provided for obtaining that higher temperature, because the only sensible limit to the degree of temperature used with the natural air was the ability to use it in the furnace satisfactorily. Therefore, the most important factor in connection with dry-blast was a maximum blast temperature.

T. C. Hutchinson said that some years ago he went very carefully into the economy of adopting the principle advised by Mr. Gayley, and he obtained an estimate of the cost of installing it at his works, but the amount of the tender, for supplying the apparatus necessary to dry the air for his five furnaces, was close upon $350,000. He calculated that it would take twelve years, with interest at 5 per cent., to overcome the original expenditure, and he came to the conclusion that he could put his money to better advantage, and consequently he did not accept the scheme. He had not heard anything yet that convinced him that it was economical to dry the air for the blast furnaces, at any rate in the Cleveland district.

Mr. Rees, speaking with regard to the greater amount of moisture in the United States, said that the maximum moisture in the blast at his furnaces with natural air was 4 to 4¾ grains per cubic foot, and this had been reduced by drying the air to 1 to 1¼ grains per cubic foot. In the United States the moisture amounted to as much as 11 grains per cubic foot, but this had also been reduced to 1½ to 1¾. Thus, in spite of the enormous difference in the amount of moisture, there had been a larger percentage of reduction; in other words, the improvement was not in proportion to the actual amount of moisture removed from the blast, and it was clear from these figures that

even in a locality where the moisture varied considerably very considerable improvements were obtained. The author briefly replied and maintained that it was possible, by the dry air process, to work with 50 per cent. less fuel owing to the quantity of moisture being constant.

DISCUSSION

**Shortcomings in Open-Hearth Furnaces**

Another one of the papers was "Some Fundamental Faults of Present Day Furnaces and Their Remedies," by Alleyne Reynolds. A. D. Ellis, who had been associated with Mr. Reynolds in the preparation of the paper, stated that if it were possible to obtain, as Mr. Reynolds had shown he could, sufficient heat for melting purposes without the use of gas regenerators, three great advantages were obtained. First, the gas which was swept out of the gas regenerators every time reversing took place was saved. Then there was the loss of heat contained in that gas which was thrown away, and, further, there was the advantage that the flame impinged straight on the edge of the bath rather than going down through the port and striking on the bath somewhere lower down. There was, further, the advantage gained by the expected reduction of the temperature of the gases passing up the chimney to a very considerable extent, which heat could be used either in other directions or, what came practically to the same thing, saved by reducing the amount of fuel burned in the furnace. The authors, he felt, were now able to put forward the possibility of a Siemens furnace with a reducing flame.

A. W. Richards thought the figure of 9 cwt. of coal per ton of steel given by the author was far too high. His own experience of working an old furnace of 20 to 30 tons capacity was that the coal consumption was 6½ to 7 cwt., and some of the modern furnaces in England had reduced their coal consumption to 4 cwt. Ebenezer Adamson looked upon the figure 9 cwt. as very much out of date. He had been in many Continental works where they used the basic process and tapped every six hours regularly. They used 70 to 80 per cent. of scrap, 20 to 30 per cent. pig iron. The carbon in the bath was very low on the dead melt, and they could tap very quickly, whereas if they used 50 per cent. of scrap there was 2 per cent. carbon in the bath, and a large amount of coal had to be used in getting the carbon down to the required quantity.

F. W. Harbord said that, as far as he could understand the paper, one of the claims was that the author had got a reducing atmosphere in a gas fired regenerative furnace, and still obtained the heat necessary. This was a very important point, and he understood that the device by which it was obtained was by getting the combustion in the port blocks instead of in the hearth of the furnace. This no doubt would assist considerably if it enabled one to get a more reducing flame than if the combustion was actually taking place in the hearth of the furnace, but it was a little doubtful if all the author's claims would be obtained in this respect.

As far as he understood, the idea was to regenerate the air entirely and not the gas, and, presumably, the regenerative area was practically the same as it would be if they had ordinary gas regenerators as well, only that the air was passed over a larger area, practically double the heating surface as compared with ordinary practice. At present it seemed to him that the position was that for a given volume of air gas, it was possible to raise the temperature of that air to the maximum heat of the regenerator. It was not possible to raise any higher than that. If this was so, he did not see any advantage in doubling the regenerator surface. He did not follow the author's argument that there would be no advantage in heating up the gas.

Mr. Reynolds in reply said he was fully aware of many good English plants, and, in fact, could entirely confirm what the other speakers had said as to modern Siemens furnaces; but he was deliberately taking a case of English furnaces running very hard on protracted melting.

With regard to Mr. Harbord's remarks as to the reducing gas, the point was this. With an ordinary Siemens furnace, about 40 per cent. of gas had to be burned before it was capable of raising the product of combustion, without the absorption, to the temperature of the charge, and in practice it would be found that the effect was that when the charge was melted only about two-thirds of the heating surface became heating surface at all, and it was in the oxidising furnace that he wished to burn the gas within the port. The object of doing that was that the flame should enter the furnace at full intensity, and the reason for the difference in the form of the furnace was that, in the furnace in which there were iron vapors coming into the regenerator chambers, and they tried to run the chambers as hot as the charge, they would fuse down in a week, whereas if the use of gas regenerators could be avoided it would be possible to run the regenerator chambers up to the highest temperature of the charge, and again to be able to heat the air to the highest temperature.

**Gold Medallists and Carnegie Scholars**

Dr. Adolphe Greiner, vice-president of the Institute and director-general Société John Cockerill, Seraing, Belgium, was presented with the Bessemer gold medal for the current year, and Dr. J. Newton Friend, Victoria Institute Technical School, Worcester, was presented with the Andrew Carnegie gold medal.

The awards of the Andrew Carnegie Scholarships for 1913, each carrying an appropriation of £100, were as follows: J. F. Apfelstedt, Royal Saxon High School, Dresden, to study means of transport in relation to cost of production; L. Baraduc-Muller, Paris, to carry out researches on the nature of the gases contained in liquid steel, with special reference to basic steels; Neal Brodie, Armstrong College, Newcastle-upon-Tyne, to study the formation of titanates and silico-titanates in titaniferous ore and their function in forming fusible slags; Alcan Hirsch, New York, to carry out an investigation on the electric furnace, with special reference to its use in the heat treatment of iron and steel; W. H. Patterson, Birkenhead, to make an investigation on the constitution and combustion of fuels; Hans Rudeloff, Gross-Lichterfelde W., to study the influence of the method of riveting upon the stresses in rivets and upon the tensile properties of rivet material. A further grant of £50 has been made to Dr. Johann Puppe, Königlichen Technische Hochschule, Breslau, who was the recipient of a grant of £100 in 1909.

## Crucible Steel Company Developments

The new open hearth steel plant of the Pittsburgh Crucible Steel Company at Midland, Pa., an identified interest of the Crucible Steel Company of America, is nearing completion. Six of the eight 60-ton open hearth furnaces are now being dried out and are expected to start up about June 15; the other two are to start about August 15. The open hearth building and all the equipment are laid out to accommodate 12 furnaces, and the other four will probably be added later. On May 8 ground was broken at Syracuse, N. Y., for the new plant of the Syracuse Crucible Steel Company, also an identified interest of the Crucible Steel Company of America. This plant will make high grade crucible steels, but will not be in operation until spring of next year or later.

Wisconsin manufacturers and employers of labor are making a vigorous protest against the passage by the State Senate of the substitute bill amending the Wisconsin industrial insurance or workmen's compensation act, which has now passed the Assembly. The principal objection to the amendments, which originate and are backed by the Industrial Commission of Wisconsin, is that the defense of contributory negligence is entirely abolished. Other objectionable features are that every employer will be forced to accept the workmen's compensation law and abide by it; the defense of willful misconduct is abolished; employers are made liable for injuries suffered by the employees of their contractors or sub-contractors; employees going to and from work in the usual way and on the premises are deemed to be at work.

The Trumbull Steel Company, Warren, Ohio, which expects to have its new plant ready for operation in July, will make, in addition to black and galvanized sheets and tin plate, a line of formed roofing products, including metal shingles, and probably eaves trough and conductor pipe. A large building is being erected for its roofing products department. The company's power plant and cranes are already in operation. On its private tracks it will have loading capacity for 48 cars and it will have its own engine for switching purposes.

# The Steel Corporation Dissolution Suit

## New York Hearings Resumed—President Farrell Makes Strong Defense Under Direct Examination

The hearings in the suit of the Government for the dissolution of the United States Steel Corporation were resumed in New York May 12 in room 2015 of the corporation's offices at 71 Broadway. The defense was begun before Henry C. Brown, examiner. President James A. Farrell was called to the stand and directly examined by attorney C. A. Severance for the defense. Under questioning, Mr. Farrell told his business history.

### President Farrell's Career

At the age of fifteen and a half years, in 1878, he began as a laborer in the New Haven Wire Mills at New Haven, Conn. These mills produced specialties for the use of other nearby manufacturers; for example, wire for clocks and for textile machinery, in all some 200 products. After working 14 months as a laborer, he obtained a mechanical position in the plant.

In 1882 he went to Pittsburgh, Pa., and worked as a wire drawer for the Oliver Wire Company. He became foreman in charge of the 300 workmen in the mill, which produced about 80 tons of finished product a day. In 1886 he became a salesman for the company and traveled throughout the country. In 1889 he was made sales manager and his offices were then in New York. In 1893 he was made general manager, in charge of all purchasing, manufacturing, and selling. During the subsequent depression in this country he made a study of foreign conditions and succeeded in placing half his company's product abroad in the hard times of that period.

The company was capitalized at $360,000, and this capitalization remained unchanged despite the fact that a great deal from earnings was added to the value of the working plant. There were 43 stockholders. In 1899 men who afterward organized the American Steel & Wire Company purchased a controlling interest in the Pittsburgh Wire Company. The price per share paid for the controlling stock was $250. The same price was paid for the minority shares, and Mr. Farrell sold his holdings, which were 100 shares. He figured the stock worth $60 a share more than was paid, but was of course obliged to sell. When the American Steel & Wire Company was formed, John W. Gates offered Mr. Farrell the position of sales manager, which he held until the United States Steel Corporation was organized in 1901.

Under the great consolidation, he was given charge of its foreign department. In October, 1903, the United States Steel Products Company was organized as a subsidiary of the corporation and he was called to head its organization. In the capacity of president of this selling company, he had charge of the dlistribution abroad of all except a few minor products manufactured by the United States Steel Corporation. On January 11, 1911, Mr. Farrell was placed in his present position as the president of the United States Steel Corporation.

### Concerning Directorial Influence

Mr. Farrell was asked concerning his interests in other corporations. He answered that he was not a director of any corporation except the United States Steel Corporation and of some of its subsidiaries. He said, in answer to further questions, that he had charge of all matters pertaining to the company's business except the legal and financial ends.

Taking up the affairs of the corporation in connection with the International Harvester Company, with which there are two or three interlocking directors, Mr. Farrell said that the Harvester Company uses about 150,000 tons of steel, most of which is furnished by its own subsidiary, the Wisconsin Steel Company. The sales to the Harvester Company by the Illinois Steel Company and the Carnegie Steel Company, subsidiaries of the Steel Corporation, from 1903 to date have been as follows:

| | Illinois Steel Co. Tons | Carnegie Steel Co. Tons |
|---|---|---|
| 1903 | 24,000 | 650 |
| 1904 | ..... | ... |
| 1905 | 10,000 | ... |
| 1906 | ..... | ... |
| 1907 | ..... | ... |
| 1908 | ..... | ... |
| 1909 | 1,500 | 5,200 |
| 1910 | 6,000 | ... |
| 1911 | 15,000 | 25,000 |
| 1912 | 4,900 | ... |
| 1913 | ..... | 4,464 |
| Total | 61,400 | 35,314 |

During this time the United States Steel Corporation had sold to competitors of the International Harvester Company some 872,000 tons of steel.

### Freight Rates

Asked about rates on the Bessemer & Lake Erie Railroad, owned and conducted by the corporation, Mr. Farrell stated that rates from Lake Erie ports to Pittsburgh had decreased since the formation of the Steel Corporation 11 per cent.; to the Mahoning and Shenango Valleys 5 per cent., and to the Wheeling district 20 per cent. In the meantime rates which the corporation has had to pay on the trunk lines for bituminous coal from Pittsburgh west, whether on nearby shipments, as to Sharon, or to Chicago, had advanced on the average 13 per cent. Freight rates on coke from the Connellsville and Pocahontas districts to the corporation plants had advanced 12 per cent. The rates on limestone had advanced 10 per cent. Billets and other billet rate articles cost 9 per cent. more to move from Pittsburgh east and 10 per cent. from Pittsburgh west on the trunk lines. Finished products, which were shipped to the extent of from 40,000 to 42,000 tons a day, cost 18 per cent. more in shipping west and likewise 18 per cent. more in shipping east.

Mr. Farrell's testimony was of special interest and value with regard to the export trade of the corporation.

### Sales Agencies in Over 60 Countries

The Steel Products Company, he said, has 268 agencies in upward of 60 countries, and about 40 large warehouses. The managers of the agencies are practically all Americans, and a sort of civil service rules in this department. Great care is taken to see that men are suited to positions. For example, a man might be a brilliant success in Brazil and yet a failure if placed in a different country. The exports of the corporation have increased from 1,123,323 tons with a value of $1,380,138 in 1904, to 2,537,436 tons, with a value of nearly $92,000,000, in 1912. The effort constantly to sell more highly finished products shows in the large increase of value in proportion to the increase of tonnage.

Mr. Farrell said that it would have been impractical, and even impossible, for a firm having a limited line of products to have organized successfully any such export business as has the United States Steel Corporation. Buyers are able to satisfy all their requirements in dealing with an agency such as the United States Steel Products Company. For example, the Costa Rica Railroad bought all its material complete, from ties and telegraph poles to rails, and had it all shipped in two or three vessels. Often concessions are given for new railroads, and such a country as Brazil will allow all material for the new construction to come in free provided it comes in one shipment. Such provisions make buyers anxious to take advantage of the Steel Products Company's organization. Then buyers are saved paying taxes imposed on every bill of lading by having all their requirements recorded through one such paper. Moreover, no company having a limited line could afford to keep up such a large organization. The diversity of the Steel Products Company's lines and the strength of the organization made it possible to get up a comprehensive

(Continued on page 1206)

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## The New Tariff and the Workingman

Editorial reference was made last week to the threat by Secretary Redfield, of the Department of Commerce, to use the investigating powers of his department in case reductions in wages should follow the enactment of the Underwood tariff bill. Another deliverance of the same character was made by Mr. Underwood, in the House of Representatives, just before the final vote was taken on the passage of the bill. He declared that if any manufacturer in the United States should attempt, for political reasons, to discredit the new tariff the Administration had agencies within its power to deal out punishment to such manufacturers by publicity of all the facts. Referring to the Bureau of Foreign and Domestic Commerce, which is a division of the Department of Commerce, he said:

> When a great manufacturing institution is ready to threaten its laborers with a reduction of wages because they say there has been adverse action on legislation in Congress or to reflect on the action of the Government of the United States, that bureau has the power to walk into their offices and ascertain whether there is real reason for their cutting the rates of wages of their labor, or whether it is merely a selfish attempt to put money into their own pockets. The statement has been made that this tariff bill will react on labor and affect the wages of laboring men. I give you notice now that when the men from whom you bring that message endeavor to grind labor in the interest of Republican politics, there is a bureau of this Government that is going to ascertain the reason why.

Mr. Underwood stated further that the Administration would cause investigations to be made in the case of every factory that closed on the ground that it was forced to do so by conditions precipitated by the new tariff. On May 10 Secretary Redfield sent to the Treasury Department an estimate requesting $100,000 to be used to procure data to protect the new tariff law and with it he sent a letter from President Wilson approving the step. It is stated that $1,000,000 will be asked for later, if needed.

It would appear from the above that the Administration has become highly solicitous of the welfare of the workingmen of the country after the reduced tariff goes into effect. All those who have been prominent in the work of revising the tariff and in pushing the Underwood bill through the House of Representatives have not hesitated to say that some industries would probably be seriously affected by lower rates of duty and that it might be necessary for manufacturers to make changes in their present methods, introducing greater efficiency in their establishments, for the purpose of meeting the new conditions. It is now determined by the revisionists that wages of men employed in such industries shall not be reduced.

It is interesting to observe the manner in which the proposition of Mr. Redfield and Mr. Underwood is viewed by the press. The New York Times, which is a supporter of Mr. Underwood and his tariff bill, scouts the idea of such an investigation as that threatened, believing that a search of a manufacturer's books to ascertain why he had reduced the wages of his men would be a probable violation of the Constitution. An inquiry into costs for the information of Congress while engaged in drafting revenue laws is a very different thing from a forcible search to prove that revenue laws already passed are wise, salutary and not to be complained of. It suggests that Mr. Underwood add to his tariff bill a section providing that reduction of wages by manufacturers affected by its schedules shall be deemed high treason. The New York Evening Sun

allodes to Mr. Underwood's pronouncement as an admonition that a form of official "third degree" awaits all save those who have the moral courage to succeed under a new tariff experiment.

Possibly nothing that has so far occurred in the struggle over the revision of the tariff has stirred up so much feeling as the threats alluded to above. These threats appear to reflect a conviction on the part of those who utter them that conditions are undoubtedly going to arise which will lead to charges that the new tariff is ruining American industries. It is of course impossible to prove to a certainty that any industry will be ruined, either by a reduction in duties or by a complete removal of duties. Arguments on that point are inconclusive, and the only way in which the actual fact can be arrived at is by a fair trial.

We believe that the reductions in duties proposed in the Underwood bill will greatly increase importations, but whether the increase thus made would be sufficient to bring widespread ruin is something that could only be shown by actual experience. It may safely be assumed that if a manufacturer finds his business dwindling and ascertains that his customers are taking goods of foreign origin he will do what he can to preserve or win back his trade. He will not willingly close his establishment. He will introduce economical methods and endeavor to secure greater efficiency, and if he finds that it is necessary to secure lower labor cost he will not hesitate to reduce wages even at the risk of having his methods investigated.

If the Bureau of Foreign and Domestic Commerce should make such an investigation and find that a reduction in wages was necessary, the Bureau, we presume, would frankly say so, and thus, by implication, attack the new tariff from the standpoint of the workingman. Mr. Redfield, Mr. Underwood and the other gentlemen who are now intrusted with the management of the affairs of this country may probably be invoking upon themselves the denunciation of the very people whom they are so anxious to safeguard. The threat, if carried into effect, may prove a boomerang.

## Public Speaking in the Engineering School

Through one of its alumni, an annual prize speaking contest for students of engineering and architecture has been established at Cornell University. The first contest was held April 18, and some of the eight participants had not spoken in public before. The interesting feature, however, surrounds the conditions imposed. These were made as like as possible to the procedure that a man would probably have to take in the practice of his profession, to secure interest in some building or engineering project. The idea of the contest is a valuable suggestion to the cause of engineering education. It is a recognition of the general efforts to make engineering courses of study as broad as possible without detracting from the specific lines of investigation essential in acquiring a knowledge of the fundamentals of engineering. There is no question about the value of being able to express one's self on paper, nor has the advantage of appearing well and presenting a specific case convincingly before an audience been undervalued, but it has generally not been regarded feasible to incorporate anything of the kind in the average engineering school curriculum.

The would-be contestant for the prize is first required to submit a letter as if he were asking permission to appear before a board of commissioners, and the competitors are chosen on the basis of letters submitted. The candidates in their presentation are allowed the use of lantern slides, charts or diagrams or the aid of the blackboard for illustrative purposes. The eight contestants submitted widely different subjects, and the contest was decided by a jury made up largely of members of the faculty. There are signs, it is stated, that the contest is arousing interest among the students in public speaking on other lines, including debates on engineering subjects.

The public speaking class is of value in closely linking the school career of the individual to the commercial or professional career for which he is preparing. Often is the complaint made that the majority of the graduates of engineering schools have no proper appreciation of the time element, and it is probable that in the latter months of the course of study not enough consideration is paid to this question. It follows, of course, that in the earlier part of the school work a premium should be placed on quality, but in the latter part the student should not be allowed to forget that thoroughness is not to be obtained at the expense of time. With other studies crowding him, he will probably find it as difficult to prepare for the public speaking contest as he would in his business life find himself handicapped in getting ready for some conference which he is to address.

A logical development of the public speaking contest should be a different method of writing an engineering report or an engineering paper. Too seldom does the author stop to consider that most of his audience can only be reached by making it easy to comprehend the object, the argument and the conclusions of an engineering document. Instead, one is commonly brought suddenly face to face with a wall of mathematics, which may be quite necessary and altogether illuminating, but which could just as well be relegated to a less conspicuous portion of the paper, so that full interest may be aroused at the outset and yet all the important facts be presented for those who wish to make the investigation of the article a thorough one. The engineer is less and less a self-centered individual and the public-speaking contest is a practical addition to an engineering course of study and one calculated to have a large broadening influence.

## A Decreased Cost Month

An enterprising management has obtained important results by setting apart a month each year in which the mental energy of the employees from the manager down is concentrated on decreased cost of production. In every possible way, all are stimulated to produce better results by improved methods, more concentrated endeavor, the eliminating of waste, etc. Everywhere in the factory placards call constant attention to the meaning of the movement. The impelling force is made as strong as possible. The idea is not to produce at a maximum rate for the month, and then to fall back to the former level, but to achieve an improvement which shall be permanent, at least in part. Each year has proved that the result has been obtained. Production goes up for the month, and then falls back a little, but the average of the future is the greater because of the period of concentrated effort. Loyal workmen enter into the game with vim. Under healthily stimulating conditions, especially if they are a little out of the normal, men work better. Their brains are keener. They have been pushed out of the rut. A

different month is chosen each year, because effects are governed to some extent by the season.

Of course, the success of such a plan must depend a great deal on the personality of the management. Where a broad gap exists between it and the working forces, results under a condition which in any circumstance is somewhat artificial cannot be so productive as where relations are of the friendliest. Again, the system of employment, whether men work on bonus or by the piece or for day wages, doubtless makes a wide difference. Ordinarily, the bonus system, such as is in vogue at the factory in question, would accomplish much more than either piece work or hourly wage, because with each successful effort of the workman his own income increases. If his suggestion and invention and effort are of the sort that will secure a permanently increased output, the more he will profit by it. Under these circumstances the cost reduction month is a money-making affair for him. The same inspiriting atmosphere would exist under a piece-work system where the remuneration is never decreased unless methods or equipment are improved at the instance of others than the workman. This in itself is so closely allied to the bonus system as to be only a modification of the same idea.

## Charles A. Schieren Returns from Europe

Charles A. Schieren, Jr., president Charles A. Schieren Company, New York, returned May 12 from his annual business trip abroad. He was gone six weeks and visited London, Berlin and Hamburg. In the last-named city his company has a warehouse which carries the largest stock of leather belting in Europe. He found manufacturing in Germany going ahead with full speed, some lines in particular, including the textile industry, being busy with orders that will last into 1914. As for the proposed lower tariff in this country, Mr. Schieren expresses the opinion it will not bring lower prices to the extent that many domestic consumers expect. American buying has already increased in Germany in anticipation of lower duties, but the increased American demand has been met in many cases by advances of from 10 to 15 per cent. Mr. Schieren believes that foreign manufacturers will profit to a considerable extent under the new tariff in view of advances they will make in the prices of their products. The Charles A. Schieren Company has just received the diploma awarding the grand prize for its exhibit at Turin, Italy. It is a handsome specimen of printing in colors. Announcement of the awarding of the prize was made some time ago.

## April Copper Production and Stock

The decrease in the stock of copper for April was exceedingly large, amounting to 28,720,162 lb., as compared with a decrease of 18,032,928 lb. in March, which in itself was large, having been nearly tenfold that of February. This is not due to any great reduction in the April production, which was only 918,447 lb. less than March and nearly 4,500,000 lb. more than February. The April statement issued by the association compares as follows with the figures for the previous month:

| | April, pounds | March, pounds |
|---|---|---|
| Stock of marketable copper of all kinds on hand at all points in the United States at first of the month | 104,269,270 | 122,302,198 |
| Production of marketable copper in the United States from all domestic and foreign sources in the month | 135,333,402 | 136,251,849 |
| Deliveries of marketable copper in the month: | | |
| For domestic consumption | 78,158,837 | 76,585,471 |
| For export | 85,894,727 | 77,699,306 |
| Total deliveries | 164,053,564 | 154,284,777 |
| Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month | 75,549,108 | 104,269,270 |

The deliveries increased nearly 10,000,000 lb. over March, over 8,000,000 lb. of this increase being for export.

## Newark Technical School Commencement

The graduation exercises of the twenty-fifth class of the Newark Technical School, Newark, N. J., took place May 12 when 24 young men received diplomas attesting the completion of courses in the various classes for molders, draftsmen, machinists, electricians, tool makers, etc. The exercises were witnessed by a large audience. The certificates and diplomas were presented by A. V. Hamburg, president Newark Board of Trade, which has supervision over the school. The address in behalf of the graduates was made by Frank A. Ritchings, president of the class of 1913.

Occupying seats on the platform were President G. Hannay, A. E. Barlow, Franklin Phillips and other members of the Newark Foundrymen's Association, who have been keenly interested in the class in foundry practice. This class, which was conducted by George Heggie, consisted of five members, and in the last two years there has not been one absence on the part of any member. Mr. Hannay, on behalf of the Newark Foundrymen's Association, presented several books on foundry and metallurgical subjects to the prize-winning members of the class, namely, George Smith, Hay Foundry Company; William Jenkins, Riverside Steel Casting Company, and James Rae, Singer Mfg. Company. Mr. Hannay also presented similar prizes on behalf of *The Iron Age*. The board of trustees of the school consists of James F. Fielder, Governor of New Jersey, president ex-officio; Jacob Haussling, mayor of Newark; Samuel E. Robertson, M.D.; Franklin Phillips, Hewes & Phillips Iron Works; Frederick L. Eberhardt, Gould & Eberhardt; John B. Stobaeus, Peter Campbell, Herbert P. Gleason and John A. Furman. Charles A. Colton is secretary.

## The Tariff Bill Now in the Senate

The House of Representatives passed the Underwood tariff bill May 8 by a vote of 281 to 139. Five Democrats voted against the bill, while four Progressives, two Republicans and one Independent voted in favor of it. The Republican votes in its favor came from Representatives Carey and Stafford, both of Milwaukee, Wis. The Progressives who voted in favor of it were Representatives Kelly of Pittsburgh and Rupley of Carlisle, Pa.; Knowland of Alameda, Cal., and Bryan of Bremerton, Wash. Representative Kent of Kentfield, Cal., was the Independent. The bill is now under consideration in the Senate. Its passage through that body will not be so smooth and rapid.

## Steel Corporation Orders Smaller

A falling off of 490,194 tons in unfilled orders is shown by the United States Steel Corporation's statement for April 30, the total then being 6,978,762 tons, against 7,468,956 tons at the close of March. The decrease of 490,194 tons in April compares with a decrease of 187,758 tons in March, 170,654 tons in February and 104,796 tons in January, while in December there was a gain of 79,281 tons, following one of 258,502 tons in November and the remarkable one of 1,042,874 tons in October. The table below gives the unfilled tonnage for each month back to December 30, 1911, and previous to that for the end of each year:

| | | | |
|---|---|---|---|
| April 30, 1913 | 6,998,762 | September 30, 1911 | 3,611,317 |
| March 31, 1913 | 7,468,956 | August 31, 1911 | 3,584,085 |
| February 28, 1913 | 7,656,714 | July 31, 1911 | 3,695,985 |
| January 31, 1913 | 7,827,368 | June 30, 1911 | 3,361,058 |
| December 31, 1912 | 7,932,164 | May 31, 1911 | 3,113,187 |
| November 30, 1912 | 7,852,883 | April 30, 1911 | 3,218,704 |
| October 31, 1912 | 7,594,381 | March 31, 1911 | 3,447,301 |
| September 30, 1912 | 6,551,507 | February 28, 1911 | 3,400,543 |
| August 31, 1912 | 6,163,375 | January 31, 1911 | 3,110,919 |
| July 31, 1912 | 5,957,079 | December 31, 1910 | 2,674,757 |
| June 30, 1912 | 5,807,346 | December 31, 1909 | 5,927,031 |
| May 31, 1912 | 5,750,983 | December 31, 1908 | 3,603,527 |
| April 30, 1912 | 5,664,885 | December 31, 1907 | 4,624,552 |
| March 31, 1912 | 5,304,841 | December 31, 1906 | 8,489,719 |
| February 29, 1912 | 5,454,200 | December 31, 1905 | 7,605,086 |
| January 31, 1912 | 5,379,721 | December 31, 1904 | 4,696,203 |
| December 31, 1911 | 5,084,761 | December 31, 1903 | 3,215,123 |
| November 30, 1911 | 4,141,955 | December 31, 1902 | 5,347,523 |
| October 31, 1911 | 3,694,328 | | |

A heavy decrease in idle freight cars occurred in the fortnight ended May 1, according to the bulletin of the American Railway Association. On that date the net surplus of idle freight cars on the lines of the United States and Canada was 39,799, against 57,498 April 15. The net surplus of box cars decreased from 15,563 to 11,196, while the surplus of coal cars shrank from 19,649 to 8510.

## The M. Rumely Company Reorganized

Clarence S. Funk has resigned as general manager of the International Harvester Company and has been elected president of the M. Rumely Company, La Porte, Ind. It is conceded that the International Harvester Company acquiesced in the departure of Mr. Funk for the general good of the implement business and with great reluctance. With the advent of Mr. Funk as president the resignations of A. J. Rumely as president, J. J. Rumely as vice-president and Dr. E. A. Rumely as general manager are effective. Under the new régime the complete domination of the property rests with Mr. Funk, William Salomon & Co. and Hallgarten & Co.

The new executive committee consists of President Funk, James A. Patten, Elisha Walker and John H. Guy, who was recently appointed vice-president in charge of finances. The finance committee is made up of President Funk, Elisha Walker, of William Salomon & Co., and Max Horwitz, of Hallgarten & Co. H. J. Berghoff, J. J. Rumely and John Wolf have resigned from the board of directors to be succeeded by Mr. Funk, Paul D. Cravath and Herman Gifford. It is thus apparent that the interests financing the company's requirements are now in complete control and as a result additional loans to the amount of $5,500,000 have been made. Of this sum the underwriters will furnish $2,000,000 on unsecured notes maturing in 18 months, while the balance will be taken by New York and Chicago banks on regular limited time loans.

For the greater security of the company's position, it is understood that the gross business of the current year has already been reduced from $28,000,000 to $22,000,000 and a further reduction is likely. The terms of Mr. Funk's remuneration provide a bonus to him contingent upon the company's earnings, in addition to a fixed salary.

## Philadelphia Foundrymen's Association

At the usual monthly meeting of the Philadelphia Foundrymen's Association, held May 7 at the Hotel Walton, Harry J. Shoemaker, secretary Pennsylvania Manufacturers' Association, made an interesting address on the proposed workmen's compensation act of Pennsylvania. Ten states, he said, now have workmen's compensation laws and four operate under insurance plans, but none is so drastic as that which has passed the Pennsylvania House of Representatives and is now before the Senate. In his opinion the rights of the employer are practically ignored in this bill, and if it becomes a law it will undoubtedly be attacked as unconstitutional. The insurance provision, he said, would not tend to create a desire on the part of the employer to adopt the most modern means of accident prevention. He also referred to other bills now before the Legislature, in which employers of labor, and particularly manufacturers, are deeply interested. These include the minimum wage bill, which provides for a commission to investigate plant operations and fix a minimum wage basis for females and minors; the child labor bill, which limits working hours to 48 per week, and the woman's employment limitation bill, limiting the working hours of women to 50 per week. Considerable discussion took place in connection with these bills, following which luncheon was served at which brief addresses were made by President Thomas Devlin and others.

The Stove Founders' National Defense Association held its annual meeting at the Hotel Astor, New York, May 13. George Mitchell, Pittston, Pa., was re-elected president. William H. Cribben, Chicago, was elected first vice-president and Arthur W. Walker, Boston, second vice-president. Other officers re-elected were William A. Dwyer, Detroit, Mich., treasurer; Thomas J. Hogan, Chicago, general secretary; Percival W. Elliott, Boston, assistant secretary. The general executive committee is composed of George Mitchell, William H. Cribben, William A. Dwyer, E. W. Anthony, Arthur W. Walker, J. A. Lansing, Edwin F. Hill, George H. Barbour, Stanhope Boal, N. H. Burt and J. W. Emery.

The International Harvester Company has re-shipped from the seaboard to Auburn, N. Y., the machinery taken from its twine mill which was on the way to Germany. The strike at Auburn has been settled satisfactorily and the plant is to be retained in this country.

## American Car & Foundry's Berwick Plant Visited

A number of prominent railroad officials and manufacturers visited the Berwick plant of the American Car & Foundry Company at Berwick, Pa., May 2, under the personal guidance of C. D. Eaton, sales agent of the company. Ordinarily a visit to a large plant means a desultory wandering through a shop or two, but in this case it was inspected thoroughly, special attention being given to the machines and labor-saving devices, as the plant possesses modern equipment in all details. The first steel passenger car manufactured in the United States was made in this shop for the Interborough Rapid Transit Company for use in the New York Subway. The visitors were:

R. L. Ahles, president, Sweet's Steel Company; C. H. Bickell, purchasing agent, Tidewater Oil Company; G. C. Bishop, superintendent motive power, Long Island Railroad; F. L. Blendinger, assistant to vice-president, Lehigh Valley Railroad; H. C. Boardman, superintendent dining car service, Delaware, Lackawanna & Western Railroad; Joe Burns, traffic manager, New York City; W. C. Bower, purchasing agent, and A. E. Calkins, assistant to superintendent rolling stock, New York Central & Hudson River Railroad; C. L. Calkins, purchasing agent, Corn Products Refining Company; J. S. Casey, M. H. Treadwell Company; E. N. Chilson, manager of purchases, J. G. White & Co., Inc.; W. R. Collins, purchasing agent, Erie Railroad; M. Jackson Crispin, general manager and treasurer, U. S. Metal & Mfg. Company; J. S. Doyle, superintendent car equipment, Interborough Rapid Transit Company; C. A. Draper, purchasing agent, New York, Ontario & Western Railroad; F. E. Driscoll, Erie Railroad; P. S. Dyer, president, American Horse Shoe Company; R. W. Frohwein, purchasing agent, M. H. Treadwell Company; M. Fuhrer, purchasing agent, Interborough Rapid Transit Company; B. A. Hegeman, vice-president, U. S. Metal & Mfg. Company; C. C. Hubbell, purchasing agent, Delaware, Lackawanna & Western Railroad; Herman Josias, purchaser for the Cuba Company; W. L. Long, purchasing agent, United Fruit Company; H. F. Lowther, assistant purchasing agent, Delaware, Lackawanna & Western Railroad; H. J. McQuade, treasurer, Lehigh Valley Coal Company; J. R. Pels, purchasing agent, Warner Sugar Refining Company; W. L. Pepperman, assistant to president, Interborough Rapid Transit Company; E. V. Peters, New Jersey Zinc Company; N. W. Porter, assistant purchasing agent, Standard Oil Company of New Jersey; A. Riley, paymaster, New York, Ontario & Western Railroad; D. W. Ross, vice-president, Interborough Rapid Transit Company; William Schlafge, general mechanical superintendent, Erie Railroad; J. L. Smith, general Eastern passenger agent, Delaware, Lackawanna & Western Railroad; J. C. Snyder, assistant purchasing agent, New York Central & Hudson River Railroad; J. W. Sprong, purchasing agent, Delaware & Hudson Company; M. H. Treadwell, treasurer, M. H. Treadwell Company; G. L. Uhlbrock, Standard Oil Company, and S. B. Wight, general purchasing agent, New York Central Lines.

## Large Reservations for Foundry Exhibition

Preparations for the conventions of foundrymen at Chicago in the week of October 13 and for the associated exhibition under the direction of the Foundry & Machine Exhibition Company have already taken such form as to promise an exceptional success for this annual gathering. The choice of Charles A. Plamondon, president A. Plamondon Mfg. Company, as chairman of the Chicago committee on arrangements and his acceptance are especially happy, because of Mr. Plamondon's connection with the formation of the Western Foundrymen's Association at Chicago in May, 1893, just 20 years ago. Mr. Plamondon was the first president of that organization.

The importance attaching to the American Foundrymen's Association convention and the foundry exhibition is evidenced by a movement to bring to Chicago at the same time the meeting of the National Founders' Association, held annually at New York City in November, and also by a proposal to inaugurate the holding of fall meetings by the National Metal Trades Association on the same occasion.

It is reported regarding the exhibition to be held at the International Amphitheater beginning Friday, October 10, that within one month following the preliminary notice regarding the exhibit, space applications were received exceeding the entire amount used at Buffalo in 1912. By the first week in March, six months before the date of the exhibition, reservations made by 45 firms which had used a total of 18,656 sq. ft. in 1912, aggregated 23,856 sq. ft., an increase of 33 1/3 per cent. The interest displayed by builders of machine tools this year is especially noteworthy, and assurance is given that at least 25 machine tool builders will be represented by motion display and other exhibits.

# The Iron and Metal Markets

## Slackening in New Orders

### Buyers' Attitude Is Conservative

### Some Falling Off in Structural Lines—Pig Iron Lower but Inactive

The steel trade is more impressed with the rate at which new business is falling off and is more concerned with the outcome of present tendencies. There is the view that a fresh buying movement is to be expected in the third quarter through the release of business now held up by tariff and other uncertainties, and that it will help to maintain present prices for rolled products. On the other hand is the growing feeling that lower values are to be looked for and that buyers will be disposed for some time to shorten their contract periods and to specify with less freedom.

The Steel Corporation's falling off of 490,000 tons in unfilled orders in April left it still with nearly 7,000,000 tons on its books on April 30, or as much as it had in October of last year, when buying was nearing flood tide. It is the very large volume of business yet to be worked off that makes some steel producers impatient of any question as to the conditions to be met later in the year.

As against the general report, our Pittsburgh market review cites two large companies whose specifications on contracts show improvement, but the same report says that generally specifications are still 20 to 25 per cent. less than shipments and are growing smaller in wire products, sheets, tin plates and pipe.

The bar contracts of the agricultural machinery trade indicate the more cautious attitude of buyers. These have been less than expected, and the restriction some sellers started out to make, limiting contracts to this year, was removed in some cases and in others was quite unnecessary. The implement manufacturers, while having brilliant reports as to crops, are making conservative plans as to their own operations.

In structural steel the condition is indicated by reports made at the meeting of the Bridge Builders' Society in Chicago last week. Shipments in April were 79 per cent. of capacity, while new orders were 55 per cent. of capacity. American Bridge Company operations are not included. Deliveries of structural shapes are better and prices on early shipments are slightly lower, 1.50c., Pittsburgh, being common, while as low as 1.45c. has been reported on 30-day shipment.

Several good-sized buildings are to go up, including the Stevens building at Chicago, 7000 tons, let this week. At Cleveland the May Company building, 6000 tons, is coming forward, and at Pittsburgh a Statler hotel which will require 10,000 to 12,000 tons.

The plate market shows some irregularities. It is known that Eastern mills are still getting 1.60c., Pittsburgh, on some prompt business; at the same time sales of sheared plates have been made in the Central West at 1.50c., Pittsburgh, delivery in three weeks. On a recent export order of 800 tons a quotation close to 1.60c., New York, was made, with promise of rolling in 10 days.

Sheet bar contracts for the second half are still postponed. The quotation of $27.50 at Mahoning Valley mill has not led to business. Rumors of a lower basis on one prompt transaction have been unsettling.

There is less disposition to look for early activity in pig iron, the halt there being now thought significant of general conditions. Naturally, as the cost line is approached, the decline is not so rapid, but it is appreciated that supply and demand and not higher ore or higher coke than last year's will fix the price.

Southern No. 2 iron has sold at $11.75, Birmingham, and large buyers who are closely watching for the low point predict a still lower level. Northern foundry iron has sold as low as $14.50 at Ohio furnace for May and June delivery.

Strikes in the foundry trade have held up shipments from some furnaces, and the demands of labor in this and other lines are surprising in view of the signs of slackening demand.

Bessemer and basic pig iron have weakened in Pittsburgh and Valley markets, with $16.75 and $15.50 respectively the nominal basis.

The market for prompt ferromanganese has sagged off and as low as $59, Baltimore, has been reported in the past week. There are indications that jointly or otherwise some of the independent steel companies will become makers of ferromanganese if the proposed higher duty goes into effect. In that event ferromanganese may be disappointing as a revenue producer.

A 50,000-ton sale of non-Bessemer Lake ore has been made in the Pittsburgh district at less than the opening price, but it is explained that this is a resale of ore originally taken by a company now in a receivership. A 25-cent cut on another sale has caused some comment. This was ore long on dock and its disposal at a concession has no effect on contracts involving the bulk of the merchant ore to come down this year.

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## A Comparison of Prices

**Advances Over the Previous Week in Heavy Type, Declines in Italics**

At date, one week, one month, and one year previous.

| | May 14, 1913. | May 7, 1913. | Apr. 16, 1913. | May 15, 1912. |
|---|---|---|---|---|
| **Pig Iron,** Per Gross Ton: | | | | |
| Foundry No. 2 X, Philadelphia.. | *$16.75* | $17.00 | $17.25 | $15.25 |
| Foundry No. 2, Valley furnace.. | *14.50* | 15.00 | 15.50 | 13.25 |
| Foundry No. 2 S'th'n, Cin'ti... | *15.00* | 15.25 | 15.75 | 14.25 |
| Foundry No. 2, Birmingham, Ala. | *11.75* | 12.00 | 12.50 | 11.00 |
| Foundry No. 2, furnace, Chicago* | 16.00 | 16.00 | 17.00 | 14.50 |
| Basic, delivered, eastern Pa.... | 16.50 | 16.50 | 16.50 | 15.00 |
| Basic, Valley furnace ..... | *15.35* | 15.50 | 15.75 | 13.00 |
| Bessemer, Pittsburgh ..... | 17.90 | 17.90 | 17.90 | 15.15 |
| Malleable Bessemer, Chicago*.. | 16.00 | 16.00 | 17.25 | 14.50 |
| Gray forge, Pittsburgh ..... | 15.40 | 15.40 | 16.15 | 13.90 |
| Lake Superior charcoal, Chicago | 18.00 | 18.00 | 18.00 | 15.75 |
| **Billets, etc.** Per Gross Ton: | | | | |
| Bessemer billets, Pittsburgh.... | 28.00 | 28.00 | 28.50 | 21.00 |
| Open-hearth billets, Pittsburgh. | 28.50 | 28.50 | 29.00 | 20.50 |
| Forging billets, Pittsburgh .... | 36.00 | 36.00 | 36.00 | 27.00 |
| Open-hearth billets, Philadelphia | *28.00* | 29.00 | 30.00 | 23.40 |
| Wire rods, Pittsburgh ..... | 30.00 | 30.00 | 30.00 | 25.00 |
| **Old Material,** Per Gross Ton: | | | | |
| Iron rails, Chicago ..... | 16.00 | 16.00 | 16.25 | 16.00 |
| Iron rails, Philadelphia..... | 18.00 | 18.00 | 18.25 | 16.50 |
| Carwheels, Chicago ..... | *14.75* | 15.25 | 16.75 | 14.00 |
| Carwheels, Philadelphia ..... | *13.50* | 14.00 | 15.00 | 13.50 |
| Heavy steel scrap, Pittsburgh.. | *13.50* | 13.75 | 14.25 | 13.25 |
| Heavy steel scrap, Chicago..... | *11.25* | 11.75 | 12.50 | 11.75 |
| Heavy steel scrap, Philadelphia. | *12.00* | 12.50 | 13.50 | 13.50 |
| **Finished Iron and Steel,** Per Pound to Large Buyers: | Cents. | Cents. | Cents. | Cents. |
| Bessemer rails, heavy, at mill... | 1.25 | 1.25 | 1.25 | 1.25 |
| Iron bars, Philadelphia ..... | 1.57½ | 1.57½ | 1.62½ | 1.30 |
| Iron bars, Pittsburgh ..... | 1.70 | 1.70 | 1.70 | 1.25 |
| Iron bars, Chicago..... | 1.57½ | 1.57½ | 1.57½ | 1.25 |
| Steel bars, Pittsburgh, future.. | 1.40 | 1.40 | 1.40 | 1.20 |
| Steel bars, Pittsburgh, prompt.. | 1.70 | 1.70 | 1.85 | 1.20 |
| Steel bars, New York, future.. | 1.56 | 1.56 | 1.56 | 1.36 |
| Steel bars, New York, prompt.. | 1.86 | 1.86 | 2.01 | 1.36 |
| Tank plates, Pittsburgh, future. | 1.45 | 1.45 | 1.45 | 1.25 |
| Tank plates, Pittsburgh, prompt. | 1.60 | 1.60 | 1.70 | 1.25 |
| Tank plates, New York, future. | 1.61 | 1.61 | 1.61 | 1.36 |
| Tank plates, New York, prompt | 1.76 | 1.76 | 1.76 | 1.36 |
| Beams, Pittsburgh, future..... | 1.45 | 1.45 | 1.45 | 1.25 |
| Beams, Pittsburgh, prompt..... | 1.50 | 1.50 | 1.70 | 1.25 |
| Beams, New York, future ..... | 1.61 | 1.61 | 1.61 | 1.36 |
| Beams, New York, prompt..... | 1.66 | 1.66 | 1.71 | 1.36 |
| Angles, Pittsburgh, future..... | 1.45 | 1.45 | 1.45 | 1.25 |
| Angles, Pittsburgh, prompt..... | 1.50 | 1.50 | 1.70 | 1.25 |
| Angles, New York, future..... | 1.61 | 1.61 | 1.61 | 1.36 |
| Angles, New York, prompt..... | 1.66 | 1.66 | 1.71 | 1.36 |
| Skelp, grooved steel, Pittsburgh. | 1.45 | 1.45 | 1.45 | 1.15 |
| Skelp, sheared steel, Pittsburgh. | 1.50 | 1.50 | 1.50 | 1.20 |
| Steel hoops, Pittsburgh ..... | 1.60 | 1.60 | 1.60 | 1.25 |

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

| Sheets, Nails and Wire, | May 14, 1913. | May 7, 1913. | Apr. 16, 1913. | May 15, 1912 |
|---|---|---|---|---|
| Per Pound to Large Buyers: | Cents. | Cents. | Cents. | Cents. |
| Sheets, black, No. 28, Pittsburgh | 2.30 | 2.30 | 2.35 | 1.90 |
| Wire nails, Pittsburgh | 1.80 | 1.80 | 1.80 | 1.60 |
| Cut nails, f.o.b. Eastern mills | 1.80 | 1.80 | 1.80 | ... |
| Cut nails, Pittsburgh | 1.70 | 1.70 | 1.70 | 1.55 |
| Fence wire, ann'l'd, 0 to 9, Pgh. | 1.60 | 1.60 | 1.60 | 1.40 |
| Barb wire, galv., Pittsburgh | 2.20 | 2.20 | 2.20 | 1.90 |
| **Coke, Connellsville,** Per Net Ton, at Oven: | | | | |
| Furnace coke, prompt shipment | **$2.20** | $2.15 | $2.25 | $2.25 |
| Furnace coke, future delivery | 2.25 | 2.25 | 2.25 | 2.25 |
| Foundry coke, prompt shipment | 2.85 | 3.00 | 3.00 | 2.50 |
| Foundry coke, future delivery | 2.90 | 2.90 | 3.00 | 2.40 |
| **Metals,** | | | | |
| Per Pound to Large Buyers: | Cents. | Cents. | Cents. | Cents. |
| Lake copper, New York | 16.00 | 16.00 | 15.75 | 16.25 |
| Electrolytic copper, New York | **15.75** | 15.62½ | 15.50 | 16.00 |
| Spelter, St. Louis | 5.35 | 5.40 | 5.60 | 6.70 |
| Spelter, New York | 5.50 | 5.55 | 5.75 | 6.85 |
| Lead, St. Louis | 4.20 | 4.20 | 4.20 | 4.05 |
| Lead, New York | 4.35 | 4.35 | 4.35 | 4.20 |
| Tin, New York | 49.62½ | 50.12½ | 49.50 | 46.12½ |
| Antimony, Hallett, New York | **8.25** | 8.12½ | 8.50 | 7.62½ |
| Tin plate, 100-lb. box, Pittsburgh | $3.60 | $3.60 | $3.60 | $3.30 |

## Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

**Plates.**—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.60c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

| Extras. | Cents per lb. |
|---|---|
| Gauges under ¼ in. to and including 3-16 in. | .10 |
| Gauges under 3-16 in. to and including No. 2 | .15 |
| Gauges under No. 8 to and including No. 9 | .25 |
| Gauges under No. 9 to and including No. 10 | .30 |
| Gauges under No. 10 to and including No. 12 | .40 |
| Sketches (including straight taper plates) 3 ft. and over | .10 |
| Complete circles, 3 ft. in diameter and over | .20 |
| Boiler and flange steel | .10 |
| "A. B. M. A." and ordinary firebox steel | .20 |
| Still bottom steel | .30 |
| Marine steel | .40 |
| Locomotive firebox steel | .50 |
| Widths over 100 in. up to 110 in., inclusive | .05 |
| Widths over 110 in. up to 115 in., inclusive | .10 |
| Widths over 115 in. up to 120 in., inclusive | .15 |
| Widths over 120 in. up to 125 in., inclusive | .25 |
| Widths over 125 in. up to 130 in., inclusive | .50 |
| Widths over 130 in. | 1.00 |
| Cutting to lengths, under 3 ft., to 2 ft. inclusive | .25 |
| Cutting to lengths, under 2 ft., to 1 ft. inclusive | .50 |
| Cutting to lengths, under 1 ft. | 1.55 |

No charge for cutting rectangular plates to lengths 3 ft. and over.

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.45c. to 1.60c. Extras on other shapes and sizes are as follows:

| | Cents per lb. |
|---|---|
| I-beams over 15 in. | .10 |
| H-beams over 18 in. | .10 |
| Angles over 6 in. on one or both legs | .10 |
| Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909 | .70 |
| Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail) | .05 |
| Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909 | .20 to .80 |
| Deck beams and bulb angles | .30 |
| Hand rail tees | .75 |
| Cutting to lengths, under 3 ft., to 2 ft. inclusive | .25 |
| Cutting to lengths, under 2 ft., to 1 ft. inclusive | .50 |
| Cutting to lengths, under 1 ft. | 1.55 |

No charge for cutting to lengths 3 ft. and over.

**Wire Rods and Wire.**—Bessemer, open-hearth and chain rods, $30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.60; galvanized, $2. Galvanized barb wire, to jobbers, $2.20; painted, $1.80. Wire nails, to jobbers, $1.80.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

*Plain Wire, per 100 lb.*

| Nos. | 0 to 9 | 10 | 11 | 12 & 12½ | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|
| Annealed | $1.75 | $1.80 | $1.85 | $1.90 | $2.00 | $2.10 | $2.20 | $2.30 |
| Galvanized | 2.15 | 2.20 | 2.25 | 2.30 | 2.40 | 2.50 | 2.90 | 3.00 |

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from April 12, 1913, iron pipe (full weight), from October 21, 1912:

*Butt Weld.*

| Steel. Inches. | Black. | Galv. | Iron. Inches. | Black. | Galv. |
|---|---|---|---|---|---|
| ⅛, ¼ and ⅜ | 72½ | 52 | ⅛ and ¼ | 67 | 48 |
| ½ | 76½ | 66 | ⅜ | 66 | 47 |
| ¾ to 3 | 79½ | 71 | ½ | 70 | 57 |
| | | | ¾ to 2½ | 73 | 62 |

*Lap Weld.*

| | | | | | |
|---|---|---|---|---|---|
| 2 | 76½ | 68 | 1¼ | 57 | 46 |
| 2½ to 6 | 78½ | 70 | 1½ | 68 | 57 |
| 7 to 12 | 75½ | 65 | 2 | 69 | 59 |
| 13 to 15 | 52½ | .. | 2½ to 4 | 71 | 62 |
| | | | 4½ to 6 | 71 | 62 |
| | | | 7 to 12 | 69 | 56 |

*Plugged and Reamed.*

| | | | | | |
|---|---|---|---|---|---|
| 1 to 3, butt | 77½ | 69 | 1 to 1½, butt | 71 | 60 |
| 2, lap | 74½ | 66 | 2, butt | 72 | 61 |
| 2½ to 4, lap | 76½ | 68 | 1¼, lap | 55 | 44 |
| | | | 1½, lap | 66 | 55 |
| | | | 2, lap | 67 | 57 |
| | | | 2½ to 4, lap | 69 | 60 |

*Butt Weld, extra strong, plain ends.*

| | | | | | |
|---|---|---|---|---|---|
| ⅛, ¼ and ⅜ | 67½ | 57 | ⅜ | 64 | 53 |
| ½ | 72½ | 66 | ½ | 68 | 61 |
| ¾ to 1½ | 76½ | 70 | ¾ to 1½ | 72 | 63 |
| 2 to 3 | 77½ | 71 | 2 and 2½ | 73 | 64 |

*Lap Weld, extra strong, plain ends.*

| | | | | | |
|---|---|---|---|---|---|
| 2 | 73½ | 65 | 1¼ | 66 | 60 |
| 2½ to 4 | 75½ | 67 | 2 | 67 | 59 |
| 4½ to 6 | 74½ | 66 | 2½ to 4 | 71 | 62 |
| 7 to 8 | 67½ | 57 | 4½ to 6 | 70 | 61 |
| 9 to 12 | 62½ | 52 | 7 and 8 | 64 | 54 |
| | | | 9 to 12 | 59 | 48 |

*Butt Weld, double extra strong, plain ends.*

| | | | | | |
|---|---|---|---|---|---|
| ½ | 62½ | 56 | ½ | 58 | 50 |
| ¾ to 1½ | 65½ | 59 | ¾ to 1½ | 61 | 53 |
| 2 to 2½ | 67½ | 61 | 2 and 2½ | 63 | 55 |

*Lap Weld, double extra strong, plain ends.*

| | | | | | |
|---|---|---|---|---|---|
| 2 | 63½ | 57 | 2 | 56 | 50 |
| 2½ to 4 | 65½ | 59 | 2½ to 4 | 61 | 55 |
| 4½ to 6 | 64½ | 58 | 4½ to 6 | 60 | 54 |
| 7 to 8 | 57½ | 47 | 7 to 8 | 53 | 43 |

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

**Boiler Tubes.**—Discounts to jobbers, in carloads on lap-welded steel, in effect from February 1, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

| *Lap-Welded Steel.* | | *Standard Charcoal Iron.* | |
|---|---|---|---|
| 1¼ and 2 in. | 60 | 1½ in. | 44 |
| 2¼ in. | 57 | 1¾ and 2 in. | 48 |
| 2½ and 2¾ in. | 63 | 2¼ in. | 44 |
| 3 and 3¼ in. | 68 | 2½ and 2¾ in. | 53 |
| 3½ to 4½ in. | 70 | 3 and 3¼ in. | 55 |
| 5 and 6 in. | 63 | 3½ to 4½ in. | 58 |
| 7 to 13 in. | 60 | Locomotive and steamship special grades bring higher prices. | |

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

**Sheets.**—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

*Blue Annealed Sheets.*

| | Cents per lb. |
|---|---|
| Nos. 3 to 8 | 1.70 |
| Nos. 9 and 10 | 1.75 |
| Nos. 11 and 12 | 1.80 |
| Nos. 13 and 14 | 1.85 |
| Nos. 15 and 16 | 1.95 |

*Box Annealed Sheets, Cold Rolled.*

| | |
|---|---|
| Nos. 10 and 11 | 1.95 to 2.00 |
| No. 12 | 1.95 to 2.00 |
| Nos. 13 and 14 | 2.00 to 2.05 |
| Nos. 15 and 16 | 2.05 to 2.10 |
| Nos. 17 to 21 | 2.10 to 2.15 |
| Nos. 22 and 24 | 2.15 to 2.20 |
| Nos. 25 and 26 | 2.20 to 2.25 |
| No. 27 | 2.25 to 2.30 |
| No. 28 | 2.30 to 2.35 |
| No. 29 | 2.35 to 2.40 |
| No. 30 | 2.45 to 2.50 |

*Galvanized Sheets of Black Sheet Gauge.*

| | Cents per lb. |
|---|---|
| Nos. 10 and 11 | 2.40 to 2.50 |
| No. 12 | 2.50 to 2.60 |
| Nos. 13 and 14 | 2.50 to 2.60 |
| Nos. 15 and 16 | 2.65 to 2.75 |
| Nos. 17 to 21 | 2.80 to 2.90 |
| Nos. 22 and 24 | 2.95 to 3.05 |
| Nos. 25 and 26 | 3.10 to 3.20 |
| No. 27 | 3.25 to 3.35 |
| No. 28 | 3.40 to 3.50 |
| No. 29 | 3.55 to 3.65 |
| No. 30 | 3.70 to 3.80 |

# Pittsburgh

PITTSBURGH, PA., May 13, 1913.

The feeling in the local steel trade is slightly better. Two leading companies report specifications against contracts showing an improvement. New orders and specifications in the mails on Monday morning were heavier than for some time. However, specifications are still 20 to 25 per cent. less in volume than shipments, and on two or three lines are growing smaller. These include wire products, sheets, tin plate and pipe. Buyers of finished material keep close watch on developments in the iron trade and are fully acquainted with the fact that pig iron is dull and weak; hence, they believe that there is no chance of higher prices on finished iron and steel in the near future, regarding indications as pointing to lower values. As soon as tariff matters are adjusted, and with good crop reports, new buying will certainly be heavier. Prices on furnace coke are a little better. The weakest item on the whole list is scrap, which has reached new low figures in the past week; dealers are selling as heavily as they can, believing that still lower values are coming.

**Pig Iron.**—The only active inquiry in the market is that of the Westinghouse Electric & Mfg. Company previously referred to. Some low prices have gone in on the inquiry. Actual sales of No. 2 foundry to other buyers have been made at $14.50, Valley furnace. A sale of 6000 to 8000 tons of Bessemer iron for each month over the remainder of the year is reported, the buyer to pay for the iron the average monthly price as determined by actual sales. Bessemer iron is still held nominally at $17, but on a recent inquiry for 3000 tons for third quarter, none of the furnaces would quote a price, asking the buyer not to close until it had been given a chance to name a price, thus indicating a weak market. Basic iron for delivery up to October has been offered at $15.35, Valley furnace. Three local consumers of basic iron are expected in the market in a short time to buy iron for actual needs, but there is no disposition to cover ahead. We still quote Bessemer iron nominally at $17; malleable Bessemer, $15; basic, $15.35 to $15.50; No. 2 foundry, $14.50 to $14.75; gray forge, $14.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh district being 90c. a ton.

**Billets and Sheet Bars.**—The market is dull, with practically no new inquiry. Consumers believe they will get lower prices on steel in the third quarter than are now ruling, and they are not anxious to cover. The sale of 10,000 tons of sheet bars reported recently at $26.50, maker's mill, has not been verified after very careful inquiry, and it is strongly believed was not made. For prompt shipment we quote as follows: Bessemer billets, $28; Bessemer sheet bars, $29; open-hearth billets, $28.50 to $29; open-hearth sheet bars, $29.50 to $30, maker's mill, Pittsburgh or Youngstown. Forging billets are still firm at $36 to $37, and axle billets at $34 to $35, Pittsburgh. Billets and sheet bars for third quarter delivery could be bought at $1 a ton or more under the above prices, probably on the basis of $27 for Bessemer billets, $27.50 for Bessemer sheet bars and about the same prices for open-hearth steel.

**Ferroalloys.**—A sale was made recently of 200 tons to a local open-hearth steel plant at $59.75, Baltimore, or $1.25 per ton less than what is regarded as the official price. Effective Tuesday, May 13, the freight rate on ferromanganese from Baltimore to Pittsburgh was advanced from $2 to $2.16 per ton. A proposal is pending to allow the railroads to charge the same freight rates on foreign ferromanganese as they charge on domestic, and if this goes through the new rate will be $3 a ton. We quote 80 per cent. English ferromanganese for prompt or forward delivery at about $61, Baltimore. New inquiry for ferrosilicon is quiet, but on the few sales being made it is said that full prices are being obtained. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. at $24; 11 per cent., $25; 12 per cent., $26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferro-carbon-titanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over; 12½c. in lots up to 2000 lb.

**Wire Rods.**—A sale of about 100 tons of screw stock rods is reported on the basis of about $32, Pittsburgh. Specifications against contracts are only fair. We quote Bessemer, open hearth and chain rods at $30, Pittsburgh, but the market is weak.

**Muck Bar.**—There have been no sales of local bar lately, and we quote best grades made from all pig iron at nominally $30, Pittsburgh. Standard grades of Eastern muck bar, made from all pig iron, are being sold at about $28, Pittsburgh.

**Skelp.**—The present market is dull, but the mills are well filled for 60 to 90 days. We quote: Grooved skelp, 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.85c. to 1.90c., delivered at buyers' mills in the Pittsburgh district.

**Steel Rails.**—Inquiry for standard sections is quite active for small lots. The rail mill of the Carnegie Steel Company at Bessemer, which rolls standard sections, is filled to July and the light rail mill to August. It is expected that the traction companies will soon place some rail business as their new buying so far this year has been light. Most of the business coming in in light rails is from the coal-mining interests. In the past week the Carnegie Company received new orders and specifications for nearly 3000 tons of light rails. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

**Structural Material.**—The American Bridge Company has taken about 2500 tons of bridge work for the Pennsylvania Lines West to replace structures destroyed by the flood. It is now claimed that the Statler interests have practically closed with H. C. Frick for the erection of a large hotel on a site owned by him bounded by Oliver and Sixth avenues and Grant street, to take 10,000 to 12,000 tons. The Mellon banking interests of this city are also figuring on the erection of a hotel to replace the present Duquesne Hotel at Smithfield street and Oliver avenue. We quote beams and channels up to 15 in. at 1.45c. to 1.50c., for delivery at convenience of the mill, which would be second half of this year, while small lots from warehouse for prompt delivery are bringing from 1.60c. up, depending on the size of the order and the deliveries wanted.

**Plates.**—No new contracts for steel cars have been placed, but active inquiries include about 12,000, and of these the Erie is expected to buy 3000 steel underframe box cars, 1500 cars of a special type and 1500 hopper coal cars. The car companies are pretty well filled for three or four months, but state that deliveries of plates and bars by the mills are still unsatisfactory. We quote ¼-in. and heavier tank plates at 1.45c., Pittsburgh, for forward delivery, while for shipment in three or four weeks 1.50c. to 1.60c. is being named for carloads and larger lots, f.o.b. Pittsburgh.

**Iron and Steel Bars.**—It is stated that practically all the contract business of the implement makers in steel bars for the second half of the year and in some cases up to July 1 next year have been placed, but the amount of such business was less than expected. Specifications against contracts for steel bars are falling off, and the new general demand is quiet. The mills rolling iron bars also report that the demand is less and specifications not so active. The demand for hard steel bars for reinforcing purposes is heavy and two local mills state they are sold up for four months. We quote merchant steel bars at 1.40c. to 1.45c. for delivery at convenience of the mill, which would not be before third quarter, while for shipment from warehouses 1.90c. to 2c. is quoted. We quote iron bars at 1.70c. to 1.75c. for reasonably prompt delivery. Mills charge $1 extra per ton for twisting ¾ in. and larger steel bars and $2 extra for ½ to ⅝ in.

**Sheets.**—The new demand for sheets is less active, and specifications against contracts are not so heavy as they were. The American Sheet & Tin Plate Company is operating this week to about 80 per cent. of its hot sheet mill capacity, and other leading sheet mills are running practically full. They state the supply of sheet bars is better and there is little interruption in operations because of lack of steel. Some mills are still

naming 2.30c. for No. 28 black and 3.40c. on 28 galvanized. We quote No. 10 blue annealed sheets at 1.75c.; No. 28 Bessemer black sheets, 2.30c. to 2.35c.; No. 28 galvanized at 3.40c. to 3.50c., and No. 28 tin mill black plate at 2.30c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

**Tin Plate.**—A good many consumers specified for their entire requirements for this year in the first quarter, and for this reason new specifications are falling off. Some of the makers state that it is a question whether consumers will be able to get satisfactory deliveries on certain sizes of tin plate, owing to the heavy specifications on the books of the mills on which they may not be able to make shipments wanted. All mills are operating to about 90 per cent. of their capacity. We quote 100 lb. cokes at $3.60; 100 lb. ternes at $3.45 and No. 28 black plate at $2.30, all f.o.b. Pittsburgh.

**Hoops and Bands.**—Most consumers of hoops and bands are covered through the third quarter and the new demand is light. Specifications against contracts are fairly heavy. The large cooperage interests contracted recently for their supply of hoops over third quarter and in some cases for last half. We quote bands at 1.40c., with extras as per the steel bar card, and hoops at 1.60c., f.o.b. Pittsburgh.

**Bolts and Rivets.**—The new demand has quieted down, but specifications against contracts are good. Some makers that have a limited amount of orders on their books are pushing for new business and are shading prices to get it. The market on bolts is on the basis of 5 per cent. less than regular discounts. Button-head structural rivets are about $2.10 and cone head boiler rivets about $2.20. Regular discounts on bolts are as follows, in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works:

| | |
|---|---|
| Coach and lag screws | 80 and 10% off |
| Small carriage bolts, cut threads | 75 and 5% off |
| Small carriage bolts, rolled threads | 75 and 10% off |
| Large carriage bolts | 70% off |
| Small machine bolts, cut threads | 75 and 10% off |
| Smal machine bolts, rolled threads | 75, 10 and 5% off |
| Large machine bolts | 70 and 7½ off |
| Machine bolts with C.P.C. and T nuts, small | 75 and 5% off |
| Machine bolts with C.P.C. and T nuts, large | 70% off |
| Square hot pressed nuts, blanked and tapped | $5.70 off list |
| Hexagon nuts | $6.30 off list |
| C.P.C. and T. square nuts, tapped and blank | $5.70 off list |
| Hexagon nuts, ⅝ and larger | $6.60 off list |
| Hexagon nuts smaller than ⅝ | $7.20 off list |
| C.P. plain square nuts | $5.20 off list |
| C.P. plain hexagon nuts | $5.50 off list |
| Semi-finished hexagon nuts ⅝ and larger | 85% off |
| Semi-finished hex. nuts smaller than ⅝ | 85 and 10% off |
| Rivets, 7/16 x 6½, smaller and shorter | 75, 10 and 10% off |
| Rivets, metallic tinned, bulk | 3½c. per lb. net extra |
| Rivets, tin plated, bulk | 1½c. per lb. net extra |
| Rivets, metallic tinned, packages | 70, 10 and 10% off |

**Wire Products.**—There is no snap to the wire trade, the new demand being dull. Specifications against contracts are not satisfactory, being much lighter than expected at this time, which is usually the active season. Little new business has been placed since the last advance. The new prices of $1.80 on wire nails and $1.60 on annealed fence wire have not been held, but have been shaded ever since they were named. Regular prices to jobbers in carload and larger lots are as follows: Wire nails, $1.80, base, per keg; cut nails, $1.70 to $1.75; galvanized barb wire, $2.20 per 100 lb.; painted, $1.80; annealed fence wire, $1.60, and galvanized fence wire, $2, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

**Railroad Spikes.**—Several makers report that specifications against contracts have been a little better in the past week, but the new demand is quiet. They have pretty well caught up on back deliveries on their contracts. Many railroads have not covered for their spike requirements for second half and a new buying movement is looked for in the near future. We quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.80 to $1.85, and small railroad and boat spikes in carload lots at $1.90 to $1.95 per 100 lb., f.o.b. Pittsburgh.

**Shafting.**—Some contracts for shafting for delivery in the last half have been placed by automobile builders, and considerable business is under negotiation. The new demand is fair, and specifications are coming in at a moderate rate. We quote cold-rolled shafting at 58 per cent. off in carload lots, and 53 per cent. in small lots delivered in base territory, the usual slight differential over these discounts being allowed to the large consumers.

**Merchant Steel.**—Specifications against contracts are not so active and the new demand has quieted down. The mills are catching up on back deliveries to some extent, but still have orders ahead for two to three months. Prices are not actually lower but are weaker. We quote: Iron finished tire, 1½ x ½ in. and larger, 1.40c. to 1.55c., base; under 1½ x ½ in., 1.55c. to 1.65c.; planished tire, 1.60c. to 1.70c.; channel tire, ¾ to ⅞ and 1 in., 1.90c. to 2c.; 1⅛ in. and larger, 1.80c. to 1.90c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.50c. to 1.65c.; concave and convex, 1.80c. to 1.90c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c. to 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

**Merchant Pipe.**—The new demand for merchant pipe is fairly active, but shipments by the mills are now considerably in excess of specifications. One large pipe mill, however, reports that its actual orders entered so far this month are heavier than in the same period in April. No large gas or oil lines have lately been placed, but the mills that make large pipe report they are filled up for three to four months. There is some shading in discounts on both iron and steel merchant pipe.

**Boiler Tubes.**—Locomotive shops are specifying freely against contracts and the new demand is heavy. Merchant tubes are fairly active, and the mills have 60 to 90 days' work ahead. Discounts on locomotive and merchant tubes are reported as being fairly well maintained.

**Coke.**—Because of threatened labor troubles at its coke works, and to assure itself of a full supply, the Bethlehem Steel Company has bought about 10,000 tons of furnace coke for prompt delivery, most of which has already been shipped; the price paid was $2.20 to $2.25 per net ton at oven. An inquiry is in the market for 3000 tons of prompt coke, and a Mahoning Valley interest is figuring on 9000 tons of furnace coke per month for shipment over the last half. Coke makers are willing to sell standard grades of furnace coke for last half at $2.25 at oven, but furnaces are not disposed to pay it, feeling they should not pay over $2. There is not much new inquiry for foundry coke, consumers being covered. We quote standard makes of furnace coke for prompt shipment at $2.20 to $2.25 per net ton at oven and 72-hr. foundry coke at $2.85 to $3. The Connellsville Courier reports the output of coke in the Upper and Lower Connellsville region last week as 403,069 net tons, a decrease over the previous week of about 12,700 tons.

**Old Material.**—Conditions in the local scrap trade are getting worse. Some dealers are pressing the market to make sales and forcing prices down further. Nearly all the dealers are freely offering carwheels, and as there is no new demand for them they have gone off in price materially. Dealers have been able to buy heavy steel scrap in the past week as low as $13.25 per gross ton, and it has been sold to consumers at $13.50. We note sales of 2000 to 2500 tons of heavy steel scrap at $13.50 to $13.60; 500 tons of cast-iron borings at $9.50 and 200 tons at $9.65; 300 tons of turnings at $7.75, all for delivery in the Pittsburgh district. Dealers are now quoting as follows, per gross ton, for delivery in the Pittsburgh and nearby districts:

| | |
|---|---|
| Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery | $13.50 to $13.75 |
| No. 1 foundry cast | 13.75 to 14.00 |
| No. 2 foundry cast | 12.75 to 13.00 |
| Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district | 9.75 to 10.00 |
| Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa. | 15.00 to 15.25 |
| No. 1 railroad malleable stock | 12.75 to 13.00 |
| Grate bars | 10.00 to 10.25 |
| Low phosphorus melting stock | 16.00 to 16.25 |
| Iron car axles | 25.50 to 26.00 |
| Steel car axles | 19.00 to 19.50 |
| Locomotive axles, steel | 23.00 to 24.00 |
| Locomotive axles, iron | 27.00 to 27.25 |
| No. 1 busheling scrap | 13.00 to 13.25 |
| No. 2 busheling scrap | 9.00 to 9.25 |
| Old carwheels | 14.25 to 14.50 |
| *Machine shop turnings | 7.75 to 8.00 |
| *Cast-iron borings | 9.25 to 9.50 |
| †Sheet bar crop ends | 16.00 to 16.25 |
| Old iron rails | 15.50 to 15.75 |
| No. 1 railroad wrought scrap | 14.25 to 14.50 |
| Heavy steel axle turnings | 10.50 to 10.75 |
| Stove plate | 9.50 to 9.75 |

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

# Chicago

CHICAGO, ILL., May 14, 1913.—(*By Telegraph.*)

With the exception of some small projects, the urgency of which admits of no delay, the buying of steel from mill appears to be suspended for the time being. It is not an uncommon circumstance to find the market conservative at this time of the year and disposed to await the coming of July before commitment to a programme for the remainder of the year. In the West the conservativism in money matters seem to be the barometer of general conditions. The most important business coming to light during the week was in structural steel, a total of over 20,000 tons being noted, of which the Big Four Railroad took over 7500 tons for bridge replacements and the new Stevens building, Chicago, 7000 tons. Little has transpired in the pig-iron market, and the trading point remains as indeterminate as a week ago. Additional weakness characterizes the scrap market and quotations are but nominal in the absence of buying of any consequence.

**Pig Iron.**—Both producing and consuming interests have done little more than mark time the past week. No transactions having a significant bearing are reported from local furnaces, though the customary routine sales have been made, certain of them at higher prices than the bulk of the business. Even less activity has been apparent in the movement of Southern iron, and the tonnage involved has been too small to make the question of price of any moment. Values are therefore unchanged from the status from last report. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

| | |
|---|---|
| Lake Superior charcoal, Nos. 1, 2, 3, 4 | $18.00 to $18.50 |
| Northern coke foundry, No. 1 | 16.75 to 17.25 |
| Northern coke foundry, No. 2 | 16.00 to 16.75 |
| Northern coke foundry, No. 3 | 15.50 to 16.00 |
| Southern coke, No. 1 foundry and No. 1 soft | 16.85 to 17.35 |
| Southern coke, No. 2 foundry and No. 2 soft | 16.35 to 16.85 |
| Southern coke, No. 3 | 15.85 to 16.35 |
| Southern coke, No. 4 | 15.85 to 16.35 |
| Southern gray forge | 15.85 to 16.35 |
| Southern mottled | 15.85 |
| Malleable Bessemer | 16.00 to 16.50 |
| Standard Bessemer | 19.40 to 19.90 |
| Basic | 16.00 to 16.50 |
| Jackson Co. and Kentucky silvery, 6 per cent | 20.40 |
| Jackson Co. and Kentucky silvery, 8 per cent | 21.40 |
| Jackson Co. and Kentucky silvery, 10 per cent | 22.40 |

*(By Mail)*

**Rails and Track Supplies.**—The railroads are bending their efforts toward the securing of early delivery of rails now on order and toward the laying of track and no new contracts are reported or likely to be made in the remainder of the first half of the year. The week's buying of traction rails was above the average. In this connection the purchase of street rails and specialties for the cities of the Canadian Northwest since the first of this year has been of important magnitude. We quote standard railroad spikes at 1.90c. to 2c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, $33 to $35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

**Structural Material.**—The extent of the damage to bridges suffered by some of the railroads traversing the flooded districts of recent date is becoming more apparent. The Big Four has just placed orders for bridge steel totaling over 7500 tons, the distribution of which has been governed in large measure by the deliveries named. Of the total the Pennsylvania Steel Company will furnish 4000 tons, the Illinois Steel Company 2000 tons and the King Bridge Company and the Toledo works the remainder. The important item among the other contracts placed during the week was 7000 tons for the Stevens Building at Chicago, the award being made to the American Bridge Company. In addition to the above, 14 other contracts were placed carrying an aggregate of 2931 tons. The Worden-Allen Company will fabricate 237 tons for a headframe for the Cleveland-Cliffs Iron Company at Swanzy, Mich., and 230 tons for a coal handling trestle for the National Brake & Electric Company at Milwaukee. The Minneapolis Steel & Machinery Company will furnish 213 tons for the Northern Mississippi River Power Company and 225 tons for the Great Northern Railway Company's power house at Minneapolis. Christopher & Simpson took 125 tons for the Mercantile Building at St. Louis; the Kenwood Bridge Company, 101 tons for the Chicago shops of the Chicago & Northwestern; Paxton & Vierling, 320 tons for the U. S. yards at Omaha; the American Bridge Company, 129 tons for the Duluth, South Shore & Atlantic; the Security Construction Company, 448 tons for the Trinity Methodist Church at Los Angeles; the Massel Iron Works, 150 tons for the Myron Stratton Home, Colorado Springs; the Detroit Bridge Company, 300 tons for the Michigan Central. The Missouri, Oklahoma & Gulf placed 194 tons for its machine shop at Muskogee, Okla. A county bridge at Dale, Ill., will take 130 tons and the Crawford & McCrimmon Company, Brazil, Ind., awarded 129 tons for a new machine shop. Some of the fabricators in this territory are finding their stock of materials rather heavy in proportion to the business offering, and work for prompt fabrication is in demand. The mill situation as to deliveries has not been materially bettered as yet. For Chicago delivery from mill, we quote for plain shapes, 1.63c. to 1.68c.

The business offering in the warehouse trade in structural shapes continues to be one of the more active items, particularly with respect to the smaller sizes in angles and channels. A reminder of the exceptional conditions of last fall appeared in an order placed last week for 250 tons of structural shapes out of store. We quote for store delivery at Chicago 2.05c.

**Plates.**—Offerings of plate tonnage are unimportant, and aside from the increasing opportunity for obtaining prompt delivery plates from mill without premium, the situation offers little that has any new interest. We quote for Chicago delivery from mill, 1.63c. to 1.68c.

From store for Chicago delivery we quote 2.05c.

**Sheets.**—The expected concession of $2 from the regular prices of galvanized sheets, while quite general, affects the local mill but slightly inasmuch as there is very little business for which it can offer an acceptable delivery. The weakness which prevails, although it reflects an unmistakable eagerness on the part of some mills for business, is no more than proportionate to the decline in spelter costs. We continue to quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.53c.; No. 28 galvanized, 3.58c. to 3.68c.; No. 10 blue annealed, 1.93c.

Prices out of store continue without change as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

**Bars.**—It is estimated that not more than 30 per cent. of all the implement bar business has been placed thus far and contracts are coming in in a very desultory manner. Specifications on existing contracts show little if any decrease. Hard steel bars and reinforcing bars, generally taken in carload lots, are moving at a rate sufficient to keep the mills running practically full. Bar-iron specifications developed an increase in volume last week as compared with the week previous but new business is light. Prices are holding firmly. We quote for mill shipment as follows: Bar iron, 1.57½c. to 1.62½c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 58 per cent off; less than carloads, 53 per cent off.

Bar tonnage continues to be the important item out of store, but requirements are hardly as exacting in their volume as a short time back. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¾ in. and over, and usual card extras for smaller sizes; shafting 53 per cent. off.

**Wire Products.**—The month of April brought out a good volume of specifications in wire products. Wire nails, barb wire and plain wire were most prominent. New buying would appear to indicate that a considerable portion of the stock in jobbers' hands had been worked off during the winter and early spring months. We quote as follows to jobbers: Plain wire, No. 9 and coaser, base, $1.78; wire nails, $1.98; painted barb wire, $1.98; galvanized, $2.38; polished staples, $1.98; galvanized, $2.33, all Chicago.

**Rivets and Bolts.**—With very few contracts offering and order books rapidly growing lighter with the expiration of current contracts, bolt prices reflect somewhat disorganized conditions. Rivet quotations likewise depart from nominal prices to the extent of substantial concessions. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ⅜ x 4 in., rolled thread, 70-10-5; cut thread, 75-10; large size, 70-7½; coach screws, 80-10; hot pressed nuts, square head, $5.70 off per cwt.; hexagon, $6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.38c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-7½; larger sizes, 65-5, carriage bolts up to ⅜ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, $5.30, and hexagon, $5.90 off per cwt.

Cast-Iron Pipe.—Contracts at Cherokee, Iowa, for 150 tons and at Big Rapids, Mich., for 350 tons were among the awards of the past week. The pipe tonnage at Lima, Ohio, was divided between the Massillon Iron & Steel Company and W. E. Clow & Co. At Port Huron, Mich., from 500 to 1000 tons is to be purchased and at Evansville, Ind., the letting of 1000 tons has been authorized. We quote as follows per net ton, Chicago: Water pipe, 4 in., $28.50; 6 to 12 in., $26.50; 16 in. and up, $25.50, with $1 extra for gas pipe.

Old Material.—In the absence of practically all buying for consumption, the local scrap market can be gauged with no more than approximate correctness. Buyers do not appear to be interested in accepting offers at any price. Our quotations are accordingly less representative of actual transactions than they are of the sentimental value of the various items. It is thought that only a portion of the railroad scrap offered a week ago has been absorbed. Additional offerings last week included 1200 tons from the Chicago, St. Paul, Minneapolis & Omaha, 400 tons from the Frisco Lines and 2000 tons from the Michigan Central. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

| | *Per Gross Ton* | |
|---|---|---|
| Old iron rails | $16.00 to | $16.50 |
| Old steel rails, rerolling | 14.00 to | 14.50 |
| Old steel rails, less than 3 ft. | 12.00 to | 12.50 |
| Relaying rails, standard section, subject to inspection | | 24.00 |
| Old carwheels | 14.75 to | 15.25 |
| Heavy melting steel scrap | 11.25 to | 11.75 |
| Frogs, switches and guards, cut apart | 11.25 to | 11.75 |
| Shoveling steel | 11.00 to | 11.50 |
| Steel axle turnings | 9.50 to | 10.00 |
| | *Per Net Ton.* | |
| Iron angles and splice bars | $15.00 to | $15.50 |
| Iron arch bars and transoms | 15.25 to | 15.75 |
| Steel angle bars | 10.75 to | 11.25 |
| Iron car axles | 19.75 to | 21.25 |
| Steel car axles | 17.25 to | 18.00 |
| No. 1 railroad wrought | 11.25 to | 11.75 |
| No. 2 railroad wrought | 10.75 to | 11.25 |
| Cut forge | 10.75 to | 11.25 |
| Steel knuckles and couplers | 11.25 to | 11.75 |
| Steel springs | 11.50 to | 12.00 |
| Locomotive tires, smooth | 12.25 to | 12.75 |
| Machine shop turnings | 6.00 to | 6.50 |
| Cast and mixed borings | 5.50 to | 6.00 |
| No. 1 busheling | 9.50 to | 10.00 |
| No. 2 busheling | 7.00 to | 7.50 |
| No. 1 boilers, cut to sheets and rings | 8.25 to | 8.75 |
| Boiler punchings | 12.25 to | 12.75 |
| No. 1 cast scrap | 11.50 to | 12.00 |
| Stove plate and light cast scrap | 9.75 to | 10.00 |
| Railroad malleable | 12.25 to | 12.75 |
| Agricultural malleable | 10.75 to | 11.25 |
| Pipes and flues | 8.50 to | 9.00 |

# Philadelphia

PHILADELPHIA, PA., May 13, 1913.

Buyers of pig iron continue to show lack of interest. Outside of the recent heavy basic sales, merchant furnaces have been taking orders and shipping iron equal to the current make. The finished material markets are quieter, the demand for heavy plates holding up better than for any other class of material. Billet makers are not seeking business, but accept moderate orders for rolling steel at $28 to $30 here. Sheets are active. Iron bars remain quiet. Moderate coke sales are being made at unchanged prices. The old material market is soft and lower quotations have developed on small transactions in some grades.

Iron Ore.—The market is at a standstill. Importations during the week include 6993 tons from Spain and 5300 tons from Cuba.

Pig Iron.—Most consumers of foundry iron are buying only from hand to mouth. Prompt shipment is usually specified, as stocks at foundries are so low that delays would interfere with their operations. Inquiry is meager. Notwithstanding the generally good statistical position in this district, stocks being stationary and unfilled orders larger, as well as the rapid approach of selling prices to the cost line, producers are anxious for business. While not openly making lower prices, a customer ready to buy can usually do slightly under the general market. Reports of small sales of standard No. 2 X foundry at $16.75, delivered in tihs vicinity by furnaces outside the district, are heard and some Eastern makers are now prepared to accept that figure. Cast-iron pipe makers have not been active buyers, although one interest is reported to have made a purchase of 1000 tons at a low price. The movement in Virginia foundry iron is light; there is more or less uncertainty as to prices, and while moderate sales of No. 2 X and No. 2 plain have been made at $14.50 and $14.25 at furnace respectively, an actual buyer could easily shade those quotations. A recent inquirer for 500 to 1000 tons of specification coke malleable pig has made a small purchase, but is still in the market. The demand for rolling mill forge iron has become less active; quotations, however, range from $15.75 to $16, delivered in this district. A little more business has been transacted in steel-making irons, but the demand is light. A large buyer of standard analysis low phosphorus pig has extended a contract for a block of that grade for second half delivery at a price which would represent about $23.50 delivered here. A trade deal involving 1000 tons of basic pig against structural material by a producer and consumer in this district represents the entire movement in basic iron. For near future delivery in buyers' yards in this district the following range of prices can be done for standard brands:

| | |
|---|---|
| Eastern Pennsylvania No. 2 X foundry | $16.75 to $17.00 |
| Eastern Pennsylvania No. 2 plain | 16.50 to 16.75 |
| Virginia No. 2 X foundry (nominal) | 17.30 to 17.50 |
| Virginia No. 2 plain (nominal) | 17.05 to 17.25 |
| Gray forge | 15.75 to 16.00 |
| Basic | 16.50 |
| Standard low phosphorus | 23.50 |

Ferroalloys.—Weakness in prices for prompt 80 per cent. ferromanganese is in evidence. While $61, seaboard, is the nominal quotation, this price has been shaded $1 a ton on small sales. There has been no inquiry for forward ferromanganese in this district. Ferrosilicon has been in light demand. Delayed deliveries on Western furnace ferrosilicon held up by the recent floods are now coming through. Importations of ferromanganese at this port last week aggregated 950 tons.

Billets.—Eastern makers are well sold up for the second and third quarters and are not seeking business aggressively. At the same time, such business as may be offered is usually taken at slightly lower prices unless urgent delivery is required. Orders for rolling billets continue to be tendered to Eastern mills by consumers in the West, but as prompt delivery is usually required makers in this district have not been able to accept the business. Basic open-hearth rolling billets for near future shipment are quoted at $28 to $30, delivered, while ordinary analysis forging billets command $34 minimum, Eastern mill.

Plates.—A satisfactory volume of miscellaneous business continues to come out. Orders are as numerous as ever, but consumers are usually purchasing in smaller quantities. Mills are gaining slightly on unfilled tonnage, although they still have a large volume of business on their books. Bridge and tank plates are active and several good orders for car plates have been booked. Eastern mills are still able to obtain 1.75c., delivered, for reasonably early deliveries, although Western plates for extended shipment are available at 1.60c. to 1.65c., delivered here.

Structural Material.—The demand for plain as well as fabricated material continues light. Eastern mills are able to make much better deliveries except on the smaller sizes, for which 6 to 8 weeks' delivery still rules. Fabricated material prices are weak and competition for what business has been offered is sharper. Bids are going in on 1000 to 1500 tons of fabricated work for the addition to the Arcade Building. Some smaller building work is also before the trade. On the general run of business in the larger sizes of plain shapes Eastern mills are now meeting prices of Western material at 1.60c. to 1.65c., delivered here. On the smaller sizes 1.75c., delivered, is still being quoted.

Sheets.—Eastern mills are running at full capacity, but are not able to meet the demand, deliveries gradually lengthening. Where two to three weeks' delivery was obtainable mills are now not able to ship inside of four weeks. The bulk of the orders are for miscellaneous quantities, consumers usually urging prompt deliveries. Eastern and Western sheets continue on an even basis—1.90c., delivered here, for No. 10 blue annealed—although for prompt shipment Eastern smooth-rolled sheets command 1.95c., delivered.

Bars.—The situation in iron bars is rather tense. Mills generally will not make concessions from the 1.50c. mill quotation, or 1.57½c. delivered here for ordinary bars, with some makers holding at 1.62½c. minimum. Buyers, however, are not placing orders freely. Considerable business in steel bars is still unclosed, some of the agricultural implement makers in this district holding off. Prices of steel bars continue firm at 1.55c. to 1.60c., delivered in this vicinity.

Coke.—A moderate volume of business is moving in foundry coke, usually in small lots, at $2.75 to $3.25, at oven, according to grade and delivery. Some inquiry

for prompt furnace coke is noted, quotations being pretty firmly maintained at $2.10 to $2.25, at oven. Contract furnace coke is held by producers at $2.50, at oven, for second half, although little business is moving. Prices are unchanged for delivery in buyers' yards in this district, the following range per net ton being named:

| | |
|---|---|
| Connellsville furnace coke | $4.05 to $4.50 |
| Connellsville foundry coke | 4.90 to 5.35 |
| Mountain furnace coke | 3.75 to 4.10 |
| Mountain foundry coke | 4.50 to 5.00 |

**Old Material.**—Lower prices have developed in the principal grades. Buying has generally been light, but a few mills not fully supplied have been placing orders somewhat more freely. Strictly not heavy melting steel has been sold in round lots at $12.50 delivered and on some business as low at $12 has been done. Eastern mills, being fairly well supplied, now offer from $11.75 to $12.25 delivered for this grade. Dealers have been buying odd lots at $12 delivered. Old carwheels have sold at $13.50 and $14. Borings and turnings are weak. Prices are irregular but the market appears to be gradually reaching a substantial level. The following range is named for small lots for early delivery in buyers' yards in this district, covering eastern Pennsylvania at nearby points, taking a freight rate varying from 35c. to $1.35 per gross ton:

| | |
|---|---|
| No. 1 heavy melting steel | $12.00 to $12.50 |
| Old steel rails, rerolling (nominal) | 15.00 to 15.50 |
| Low phosphorus heavy melting steel scrap | 17.00 to 17.50 |
| Old steel axles (nominal) | 17.50 to 18.00 |
| Old iron axles (nominal) | 26.00 to 27.00 |
| Old iron rails | 18.00 to 18.50 |
| Old carwheels | 13.50 to 14.00 |
| No. 1 railroad wrought | 15.00 to 15.50 |
| Wrought-iron pipe | 12.00 to 12.50 |
| No. 1 forge fire | 11.00 to 11.50 |
| No. 2 light iron (nominal) | 6.75 to 7.25 |
| No. 2 cut busheling | 8.50 to 9.00 |
| Wrought turnings | 9.00 to 9.50 |
| Cast borings | 9.00 to 9.50 |
| Machinery cast | 13.50 to 14.00 |
| Grate bars, railroad | 10.00 to 10.50 |
| Stove plate | 10.00 to 10.50 |
| Railroad malleable (nominal) | 12.50 to 13.00 |

## Cincinnati

CINCINNATI, OHIO, May 14, 1913.—(*By Telegraph.*)

**Pig Iron.**—The present tendency is still downward, but the cost line in production, in both the Southern and Ironton districts, has been so closely reached that prices are resisting pressure better than was anticipated. The nominal quotation on Southern No. 2 foundry is $12, Birmingham, but this figure is being shaded. It is problematical as to what the real quotation should be, but some small business has been taken for nearby delivery at $11.75, and there are rumors that firm offers lower than this would receive consideration by producers. At the same time, a few small contracts have been made above $12 for last-half shipment. A natural consequence of the recent flood damage is the holding up of shipments to a number of melters in this district, but the majority of the foundries are now taking their iron on contract time. As far as can be ascertained, $15 Ironton, is the regular quotation on Northern iron for either prompt or last-half shipment. Few inquiries are out, and buyers are seemingly determined to await developments and take chances on the market before specifying for future requirements. Consumers of basic iron are known to be watching the market closely, but no purchases have been made in this territory in the past few days. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

| | |
|---|---|
| Southern coke, No. 1 foundry and 1 soft | $15.50 to $16.00 |
| Southern coke, No. 2 foundry and 2 soft | 15.00 to 15.50 |
| Southern coke, No. 3 foundry | 14.80 to 15.30 |
| Southern, No. 4 foundry | 14.60 to 15.10 |
| Southern gray forge | 14.40 to 14.90 |
| Ohio silvery, 8 per cent. silicon | 20.20 to 20.70 |
| Southern Ohio coke, No. 1 | 17.20 to 17.70 |
| Southern Ohio coke, No. 2 | 16.20 to 16.70 |
| Southern Ohio coke, No. 3 | 15.95 to 16.45 |
| Southern Ohio Malleable Bessemer | 16.20 |
| Basic, Northern | 16.20 to 16.45 |
| Lake Superior charcoal | 18.75 to 19.25 |
| Standard Southern carwheel | 27.25 to 27.75 |

*(By Mail)*

**Coke.**—While there is some contracting in foundry coke, sales generally are limited to small tonnages. Blast furnace operators are not disposed to buy ahead, preferring to await developments in the pig-iron market. Prices are on about the same level as for the past two weeks. Connellsville 48-hr. standard grades are quoted at $2.10 to $2.40 per net ton at oven. Standard brands of 72-hr. Connellsville coke are bringing from $3 to $3.25, although the former figure is shaded in a number of instances for prompt shipment. Wise County prices are about on the same level, but in the Pocahontas field there is a tendency to hold out for 25c. a ton above Connellsville minimum quotations on furnace coke. It is notable, however, that foundry coke is obtainable in the latter district as low as $2.50 per net ton at oven for nearby shipment. The improved demand for slack coal has some influence on coke prices.

**Finished Material.**—A general strike, involving nearly all laborers in the building trades, is now on, and this has had a tendency to cut down the demand for structural shapes, twisted steel bars, etc. However, prices have been maintained. The present local warehouse price on steel bars is 2.10c. to 2.15c. and on structural shapes 2.15c. to 2.20c. There is a fairly good call for galvanized sheets, both from the domestic and export trade.

**Old Material.**—The market is extremely dull, and prices are sagging. The rolling mills are not buying freely and do not seem disposed to make any large contracts until the pig-iron market is in a more stable condition. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

*Per Gross Ton.*

| | |
|---|---|
| Bundled sheet scrap | $9.50 to $10.00 |
| Old iron rails | 13.00 to 13.50 |
| Relaying rails, 50 lb. and up | 20.00 to 20.50 |
| Rerolling steel rails | 12.00 to 12.50 |
| Melting steel rails | 10.00 to 10.50 |
| Old carwheels | 11.75 to 12.25 |

*Per Net Ton.*

| | |
|---|---|
| No. 1 railroad wrought | $10.00 to $10.50 |
| Cast borings | 5.25 to 5.75 |
| Steel turnings | 5.25 to 5.75 |
| No. 1 cast scrap | 9.75 to 10.25 |
| Burnt scrap | 7.00 to 7.50 |
| Old iron axles | 17.25 to 17.75 |
| Locomotive tires (smooth inside) | 11.00 to 11.50 |
| Pipes and flues | 6.50 to 7.00 |
| Malleable and steel scrap | 8.25 to 8.75 |
| Railroad tank and sheet scrap | 5.25 to 5.75 |

## Cleveland

CLEVELAND, OHIO, May 13, 1913.

**Iron Ore.**—A Cleveland ore firm has sold 50,000 tons of old-range non-Bessemer ore to a consumer in the Pittsburgh district at a price somewhat lower than regular quotations. This ore was first sold to the New York State Steel Company, which was unable to use it because of the shutting down of its plant and the original seller offered the ore for resale and accepted the price of the highest bidder. Interest was recently aroused among ore sellers by a report that an important interest was offering ore at a reduction of 25c. a ton from prevailing prices. This ore is understood to be a moderate tonnage of old-range non-Bessemer that a Cleveland firm had had on the docks for a considerable time and which it was anxious to get out of the way. Employees on the Great Northern docks at Allouez Bay have made demands for an increase in wages and threaten to strike. Ore shipments are fairly heavy and cargoes are being furnished for about all of the contract boats. We quote prices as follows: Old-range Bessemer, $4.40; Mesaba Bessemer, $4.15; old-range non-Bessemer, $3.60; Mesaba non-Bessemer, $3.40.

**Pig Iron.**—The market is very dull and weak. Consumers of foundry iron as a rule are taking little interest in the market and are awaiting further price developments before covering for their last-half requirements. The Westinghouse Electric & Mfg. Company's inquiry for about 18,000 tons of foundry iron for its last-half requirements for its Cleveland and Pittsburgh plants is understood to have brought out quotations slightly under $15, Valley furnace, for No. 2, and the $15 price has been shaded in other quotations. The Akron consumer who came into the market for 900 tons for the last half is said to have purchased the desired tonnage. There are reports of a sale as low as $14.50 for 500 tons of No. 2 foundry for May and June delivery. While No. 2 foundry is nominally $15.75, delivered Cleveland, there have been no sales recently to establish local prices, and it is very probable that about $15.50 would be quoted. The Southern market is weak. While sellers in this territory are not definitely quoting No. 2 Southern at $11.50, Birmingham, they are asking for offers at that

price for delivery during the remainder of the year. So far no offers have been made that would test the position of the furnaces. We note the sale of 1000 tons of Southern charcoal in the Pittsburgh territory for the last half delivery. For shipment through the year we quote, delivered Cleveland, as follows:

| | |
|---|---|
| Bessemer | $17.90 |
| Basic | 16.25 |
| Northern No. 2 foundry | 15.75 |
| Southern No. 2 foundry | 16.35 |
| Gray forge | 15.25 |
| Jackson County silvery, 8 per cent. silicon | 20.55 |

Coke.—The market is quiet, but there is more inquiry than for some time for foundry coke contracts for the last half. For prompt shipment and contract 72-hr. foundry coke is generally quoted at $3 per net ton at oven. However, some grades can be had at $2.75. Furnace coke is quoted at $2.15 to $2.25.

Finished Iron and Steel.—While there is not much new demand the situation is generally regarded as satisfactory in view of the fact that there have been practically no cancellations of orders and in only a few cases have mills been asked to defer shipments. The consumption continues heavy, but there appears to be a disposition among some consumers to carry lighter stocks than they have recently. Mills that have caught up so that they are in shape to promise fairly good deliveries report that they are having no trouble in booking orders. There has been a further disappearance of premium prices for early delivery. Bessemer steel bars are now being offered for fairly prompt shipment at 1.40c., Pittsburgh, and sheared plates in desirable orders can be had at 1.50c., Pittsburgh, for delivery in about three weeks. An Eastern mill is offering structural material at 1.50c. for prompt shipment and another Eastern mill has reduced its price on shapes $1 a ton. Reports indicate that low prices are still being quoted on sheet bars for the last half delivery. Quotations of $27.50 have been made in Youngstown for open-hearth sheet bars for this delivery, and a $28 quotation is reported from a Pittsburgh district mill. An Eastern mill quotes forging billets at $34.65, Pittsburgh. The demand for structural material has improved. Specifications are expected this week from D. H. Burnham & Co., Chicago, for the May Company Building, Cleveland, which will require 6000 tons. This building will be erected in four units of 1500 tons each. T. H. Brooks & Co., Cleveland, have taken 450 tons for a plant addition for the Firestone Tire & Rubber Company, Akron. An Ohio railroad has placed 400 tons for bridges to replace flood losses. The Samuel Austin & Sone Company, Cleveland, has placed 300 tons with the Hamilton (Ont.) Bridge Company and 100 tons with the Dominion Bridge Company for new Canadian manufacturing plants. Lower prices are being quoted on rivets, the decline being from $2 to $4 from recent quotations. Structural rivets are quoted at 2c. Pittsburgh. Boiler rivets are firmer than structural and are held at 2.15c. to 2.20c. Some sellers will contract at these prices for the remainder of the year but others are limiting contracts to the third quarter. Bar iron is firm at 1.60c. to 1.65c., Cleveland. Warehouse prices are unchanged at 2.10c. for steel bars and 2.25c. for plates and structural material.

Old Material.—The market is very weak and no improvement in the demand has appeared. The dullness has resulted in a further decline of 50c. a ton in prices on several grades and other quotations are largely nominal. Stocks of local consumers are reported to be lower than they have been for some time, but none of the mills is in the market for scrap for future delivery and prices offered for small lots are generally below dealers' quotations. The supply is heavy and a further decline in prices is expected. We quote f.o.b. Cleveland, as follows:

*Per Gross Ton.*

| | |
|---|---|
| Old steel rails, rerolling | $14.50 to $15.00 |
| Old iron rails | 16.00 to 16.50 |
| Steel car axles | 18.75 to 19.25 |
| Heavy melting steel | 12.00 to 12.50 |
| Old carwheels | 14.50 to 15.00 |
| Relaying rails, 50 lb. and over | 23.00 to 25.00 |
| Agricultural malleable | 11.75 to 12.00 |
| Railroad malleable | 13.00 to 13.50 |
| Light bundled sheet scrap | 9.50 to 10.00 |

*Per Net Ton.*

| | |
|---|---|
| Iron car axles | $21.00 to $21.50 |
| Cast borings | 7.00 to 7.50 |
| Iron and steel turnings and drillings | 5.50 to 5.75 |
| Steel axle turnings | 8.50 to 9.00 |
| No. 1 busheling | 11.00 to 11.50 |
| No. 1 railroad wrought | 12.00 to 12.50 |
| No. 1 cast | 11.75 to 12.00 |
| Stove plate | 9.00 to 9.50 |
| Bundled tin scrap | 11.00 to 11.50 |

# Birmingham

BIRMINGHAM, ALA., May 12, 1913.

Pig Iron.—Pig iron is being offered freely at $12, with sales small. One large producer reports that it has recently sold nothing above that figure, but adds "nothing under." Another large interest freely admits that a considerable tonnage could be secured from it at $12. A furnace company which has moved its accumulations, and was for a time out of the market, has re-entered and failed in an effort to sell at $12.25. Stout denial is reiterated of the reported sale of a large tonnage to the International Harvester Company and this denial is confirmed by others than those thought to have made the deal. An order for 500 tons for France was booked during the week at something over prevailing quotations. This is the first order from France of record in recent years. The new furnace of the Woodward Iron Company will be put in operation in July. Furnace stocks increased during the month, the total of all stocks in Alabama on May 1 being about 150,000 tons. Shipments are reported as quite heavy. No interests are asking more than $12 and it is believed that lower than $12 has been done, both manufacturer and consumer expressing this belief. No such sales are, however, extant. Alabama has manufactured pig iron at a heavier rate this year than ever before. The output of the first four months has been 713,628 tons, an increase over the same period in 1912 of 130,000 tons. The production is now at the rate of 181,000 tons per month, or about 2,172,000 tons a year. There is no present indication of curtailment of production, and furnace practice has so improved that higher grades form more and more of the output. Carload lots have sold at $12 to $12.50. Bearing in mind that not all furnaces are seeking business at that figure, but that $12 is the open and prevailing quotation and that sales as low as $11.75 are believed to have been made, although not locally confirmed, nominal quotations per gross ton at furnaces are as follows:

| | |
|---|---|
| No. 1 foundry and soft | $12.50 to $13.00 |
| No. 2 foundry and soft | 12.50 to 12.50 |
| No. 3 foundry | 11.50 to 12.00 |
| No. 4 foundry | 11.00 to 11.50 |
| Gray forge | 10.50 to 11.00 |
| Basic | 12.50 to 13.00 |
| Charcoal | 24.00 to 24.50 |

Cast Iron Pipe.—Water pipe is still weak. The only new order of consequence is one involving a large tonnage for San Diego secured by the leading interest. Operations have not been curtailed, and the smaller plants have been on sizes that were in demand for extensions and repairs, thus avoiding excessive accumulations. The soil pipe trade is in better condition, owing to the amount of building. Our quotations are $22.50 per net ton for 4 in. and $20.50 for 6 in. and over, with $1 added for gas pipe.

Coal and Coke.—Coke is in brisk demand at the prices prevailing the past several months, which, per net ton, at the ovens, are: Furnace coke, $3 to $3.50; foundry, $3.50 to $4.25 for the very best grades. The demand is greater than the supply. Coal mines are busy, with prices satisfactory. Domestic mines are running on steam coal owing to the carried over stocks of domestic. General mining conditions are good, with extensive developments taking place in the field.

Old Material.—There has been no improvement, the demand being slack and price concessions have failed to produce business. Nominal quotations, per gross ton, at yards are as follows:

| | |
|---|---|
| Old iron axles | $15.00 to $15.50 |
| Old steel axles | 15.00 to 15.50 |
| Old iron rails | 13.50 to 14.00 |
| No. 1 railroad wrought | 12.50 to 13.00 |
| No. 2 railroad wrought | 10.50 to 11.50 |
| No. 1 country wrought | 10.00 to 10.50 |
| No. 2 country wrought | 9.00 to 9.50 |
| No. 1 machinery cast | 10.00 to 11.00 |
| No. 1 steel scrap | 10.50 to 11.00 |
| Tram carwheels | 11.00 to 11.50 |
| Standard carwheels | 12.00 to 12.50 |
| Light cast and stove plates | 8.50 to 9.00 |

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Ramsey & McCormack (Pratt Consolidated Coal Company) announce that they have decided to build a by-product coke plant at some point adjacent to one of their coal mining camps. They say it will probably be the Semet-Solvay system and that it will consume 1000 tons of coal per day. Specific arrangements for construction have not been perfected, but announcement as to building the plant is official. The company is the largest independent coal operator in the South, and does an extensive steam and bunker business at New Orleans, Mobile and Pensacola.

## San Francisco

SAN FRANCISCO, CAL., May 6, 1913.

Buying from store continues active in most lines. Merchants are beginning to count on a good consuming demand until late in the third quarter, at least, though they still show extreme caution in making new purchases. Stocks in some lines are rapidly diminishing, and sorting-up orders are more in evidence than for some time, but any buying beyond practically assured requirements is unlikely. The bulk of distributive business is from the usual sources, though some large consumers who usually buy direct from mill are drawing on stock for emergency requirements. A most gratifying feature is the fact that resale prices are maintained with less difficulty than for several years.

**Bars.**—Soft steel bars continue to move well in a jobbing way, and stocks have been considerably reduced, the market being short of some sizes. Specifications are accordingly coming out a little more freely, though merchants are careful not to buy beyond nearby needs. Inquiries for reinforcing bars are less numerous and, while city building is active, some curtailment of the outside movement is expected in the summer. Values are steadily maintained, but a local mill which had formerly been fully occupied with reinforcing material is turning its attention to merchant bars. Jobbing prices remain at 2.75c. for soft steel and 2.65c. for iron.

**Structural Material.**—The contracts last reported cleaned up about all the large work that was ready for letting, and little new has developed. Bids for the Oakland auditorium steel were again rejected, and new figures will be taken May 15, while the other large inquiries expected—the San Francisco auditorium and city hall—have not yet appeared. The only new contract is about 200 tons for an 8-story hotel on Mason street near Eddy, taken by the Central Iron Works. Plans are about ready for a 6-story building at Eighth and Washington streets, Oakland, and figures are being taken on a new court house at Seattle, Wash. Considerable small work is also coming up, both here and at other coast points. Deliveries of plain material are also slowly improving, but there is a shortage of some small shapes usually carried in stock. Los Angeles will take bids for steel for the new San Francisquito power plant May 23.

**Rails.**—Some street railroad buying is being done. From Los Angeles an order came for about 1000 tons of grooved girder rails last week. Plans are under consideration for extensive municipal railroad construction in this city. A fair business is being done in light rails, and plans for logging and mining railroads are taking shape both here and in the north. The California, Shasta & Eastern, new, plans a 28-mile road between Anderson and Ingot, Cal., and the Kerry Timber Company is grading for a 31-mile road near Astoria, Ore.

**Sheets.**—Some sheets are arriving by sea, and supplies are now rather large here as well as at Los Angeles. Specifications have accordingly fallen off, and while many of the regular buyers have signed up for their third-quarter supplies the tendency is to buy little ahead of current needs. The jobbing movement, however, continues active, both in blue annealed and galvanized.

**Plates.**—The desire to rush some of the bank work now under way is leading large buyers to place more business than usual with local jobbers. Mill shipments are coming in rather slowly, and stocks here are somewhat broken, causing a little better demand for early shipment, though few orders are being placed for extended delivery.

**Merchant Pipe.**—Shipments of the smaller sizes are coming through in good shape, and nobody is inclined to anticipate requirements, though there is a little more business of a sorting-up nature. Stocks are rapidly diminishing under a strong consuming demand, and a gradual increase in specifications is expected. Oil-field business is moderate, and nothing of special moment is coming up in the way of line pipe.

**Cast-Iron Pipe.**—Figures have been submitted on the San Diego inquiry, but the contract has not yet been awarded. The United States Cast Iron Pipe & Foundry Company has taken orders for about 400 tons for Los Angeles and Anaheim, Cal. Santa Cruz, Cal., is taking bids this week on 5400 ft. of 8 and 10 in. pipe, and Santa Ana, Cal., for 320 pieces of 6-in. and 100 pieces of 4-in. pipe. Sacramento and Tulare, Cal., are also in the market for small amounts.

**Pig Iron.**—Local foundry operations are about up to normal, and supplies on hand are moderate, but business remains quiet, buying being strictly on a hand-to-mouth basis. Under present conditions melters believe there is no occasion to carry any large tonnage on hand. Prices show little change, No. 1 foundry and soft being quoted at $23.08 to $23.58, and No. 2 at $22.58 per gross ton. A new factor in the market is the West Coast Iron Company, 549 Monadnock Building, this city, which has sent out notices that it will have pig iron for delivery after the end of July.

**Coke.**—Business on the spot is limited to a few small orders, and little interest is taken in domestic offerings, though some foreign coke is being bought for future delivery. Values stand about as before, Southern being quoted at $12.50 to $12.75 per net ton, and foreign, ex-yard, at $15 to $15.50 per net ton, while German Syndicate coke, to arrive, is held at a range of $12.50 to $14 per gross ton, depending on time of arrival.

**Old Material.**—A little more scrap is coming into the market than for some time, but all classes of material are in good demand and there is little accumulation in the yards. Prices are firmly held at the former range, cast-iron scrap being quoted at about $18 per net ton; steel melting scrap, $13 per gross ton; wrought scrap, $13 to $15 per net ton; rerolling rails, $17 per net ton.

## Boston

BOSTON, MASS., May 13, 1913.

**Old Material.**—The lower quotations given below may be considered as nominal, no transactions having occurred to place a true line on values. The mills are in control of the situation as to scrap, and dealers are somewhat at a loss as to the true condition. A bear movement may be operating against them, they say, or the trouble may have another meaning. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

| | |
|---|---|
| Heavy melting steel | $10.00 to $10.25 |
| Low phosphorus steel | 13.50 to 14.50 |
| Old steel axles | 14.00 to 14.50 |
| Old iron axles | 22.00 to 22.50 |
| Mixed shafting | 13.00 to 13.25 |
| No. 1 wrought and soft steel | 10.25 to 10.50 |
| Skeleton (bundled) | 8.50 to 9.00 |
| Wrought-iron pipe | 9.00 to 9.50 |
| Cotton ties (bundled) | 9.00 to 9.25 |
| No. 2 light | 3.50 to 4.00 |
| Wrought turnings | 6.50 to 7.00 |
| Cast borings | 6.50 to 7.00 |
| Machinery, cast | 12.50 to 13.00 |
| Malleable | 10.00 to 10.50 |
| Stove plate | 8.00 to 8.50 |
| Grate bars | 7.00 to 7.25 |
| Cast-iron carwheels | 13.50 to 14.00 |

## St. Louis

ST. LOUIS, MO., May 12, 1913.

The somewhat general slackening of new business has brought the market into a rather quiet state. Specifications on contract continue liberal, while the new buying is for prompt shipment, showing that material is needed.

**Pig Iron.**—There has been no further softening of prices though the situation is rather weak. For the most part business is in small lots. Consumers are not willing to make extensive commitments. Specifications on contracts are keeping up and there are even some reports of anticipation of allotments. Buyers are holding off because of the uncertainty, and though prices are weakly held there are no positive evidences of a recession from $12 in spite of reports that have been circulated of $1.50 for No. 2 Southern, Birmingham. This, in fact, is believed to be mostly buyers' talk. Furnace representatives do no more than submit offers to the furnaces, when they are below the quoted prices. Sales include 300 tons of No. 3 Southern, 1000 tons of Southern silicon iron, two lots of 500 tons of No. 2 Southern and 500 tons of malleable. Inquiries now out include 1000 tons of malleable and 500 tons of carwheel iron.

**Coke.**—Connellsville 72-hr. selected foundry coke is being quoted as low as $2.75 net ton at oven for prompt shipment. There are no offerings of coke, however, below $3 to $3.50 for contract. By-product coke is quiet at prices on the Connellsville basis.

**Finished Iron and Steel.**—Premiums have entirely disappeared and with deliveries getting into normal state there is less occasion for contracting for future shipments as liberally as has been the case. Prices, however, show no disposition to recede from the Pittsburgh basis, which has obtained so long. In standard section steel rails to about 15,000 tons are pending with prospects of early closing. The only contract closed was one for 500 tons. In structural material consumers are taking what is due, but are not contracting heavily ahead. Fabricators are fairly well stocked and with better deliveries are feeling easier as to the future. Agricultural and wagon interests are taking bars as fast as they can be delivered. In reinforcing bars deliveries are still quite extended.

**Old Material.**—The scrap market continues in a depressed state. With an embargo at the mills generally and with railroads unloading large quantities, there is no redeeming feature to the market from the dealer's point of view. The only bright spot is in the active request for relaying rails, but in these the difficulty in getting supplies is discouraging. The lists out during the week included one from the Wabash of 1500 tons, Clover Leaf 100 tons, Vandalia 400 tons, Southern 5000 tons, Mobile & Ohio 500 tons and the Government Rock Island, Ill., plant 750 tons of miscellaneous scrap and condemned supplies. We quote dealers' prices f.o.b. St. Louis as follows:

*Per Gross Ton.*

| | |
|---|---|
| Old iron rails | $12.75 to $13.00 |
| Old steel rails, re-rolling | 13.00 to 13.25 |
| Old steel rails, less than 3 ft. | 11.00 to 11.25 |
| Relaying rails, standard section, subject to inspection | 22.50 to 23.50 |
| Old carwheels | 13.50 to 13.75 |
| Heavy melting steel scrap | 11.00 to 11.25 |
| Frogs, switches and guards cut apart | 10.50 to 10.75 |

*Per Net Ton.*

| | |
|---|---|
| Iron fish plates | $11.50 to $11.75 |
| Iron car axles | 19.00 to 19.25 |
| Steel car axles | 16.50 to 16.75 |
| No. 1 railroad wrought | 10.75 to 11.00 |
| No. 2 railroad wrought | 10.25 to 10.75 |
| Railway springs | 9.00 to 9.25 |
| Locomotive tires, smooth | 11.00 to 11.25 |
| Wrought arch bars and transoms | 14.00 to 14.25 |
| Steel couplers and knuckles | 9.00 to 9.25 |
| No. 1 dealers' forge | 7.50 to 7.75 |
| Mixed borings | 5.50 to 5.75 |
| No. 1 busheling | 9.00 to 9.25 |
| No. 1 boilers, cut to sheetsa nd rings | 6.00 to 6.25 |
| No. 1 cast scrap | 9.00 to 9.25 |
| Stove plate and light cast scrap | 8.00 to 8.25 |
| Railroad malleable | 9.50 to 9.75 |
| Agricultural malleable | 8.00 to 8.25 |
| Pipes and flues | 6.50 to 6.75 |
| Railroad sheet and tank scrap | 5.50 to 5.75 |
| Railroad grate bars | 7.00 to 7.25 |
| Machine shop turnings | 6.75 to 7.00 |
| Bundled sheet scrap | 5.50 to 5.75 |

# Lower Prices on European Steel

### French and Belgian Mills Quote Lower Prices to British Consumers—A Dull Market

*(By Cable)*

LONDON, ENGLAND, May 14, 1913.

There is dullness in the iron market, due in part to the Whitsuntide holidays. In pig iron the conditions are unaltered. Stocks in Connal's stores are 222,499 tons against 217,893 tons last week.

French and Belgian semi-finished steel has been offered at low prices, sheet bars having been quoted at 98s., 2-in. billets at 92s. and blooms at 90s., Antwerp. The German Steel Works Union is not quoting. Continental finished steel is cheaper also and deliveries are obtainable in one to two weeks. We quote as follows:

Cleveland pig-iron warrants (Tuesday), 68s. 3d., against 67s. 6d. a week ago.

No. 3 Cleveland pig iron makers' price, f.o.b. Middlesbrough, 68s. 3d., against 68s. a week ago.

Ferromanganese, £11 12s. 3d., f.o.b. shipping port.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 10s.

German sheet bars, f.o.b. Antwerp, nominally 103s.

German 2-in. billets, f.o.b. Antwerp, nominally 100s.

German basic steel bars, f.o.b. Antwerp, £5 10s.

Steel bars, export, f.o.b. Clyde, £7 17s. 6d.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7 2s. 6d., a decline of 2s. 6d.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel strip plates, Scotch, delivered local yards, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s. 3d.

# German Steel Prices Crumbling

### New Orders Are Scarce but the Outlook Has Some Good Features

BERLIN, May 2, 1913.

Steel prices continue to crumble where they are not protected by firm trade organizations. Nevertheless, the market is not utterly sunk in pessimism. At the meeting of the Steel Works Union last week the representatives of the companies indulged in a more hopeful tone than previously. The change was said to be due to the large prospective demands of the Prussian railroads for the next fiscal year, which begins 11 months hence. According to information in the hands of some of the members, the government roads will call for 700,000 tons of rails and ties, above 100,000 tons of other supplies of various classes, and it is expected that supplementary orders will reach 100,000 tons.

The most sensitive section of the trade continues to be steel bars. This week prices for home delivery have further fallen and are now 112 to 113 marks, which is 12 to 13 marks below the high level reached last fall and maintained fairly well through the winter. This is due to the fact that the great mixed works are bidding more sharply for trade, inasmuch as buyers still fail to come forward. The export price of steel plates has also been reduced from 125 to 124 shillings.

#### Belgium Declines Affect German Prices

The weakness in Germany has undoubtedly been increased by further declines in Belgium. Several days ago a Brussels dispatch reported that the export price of soft steel bars was now 110 to 112 shillings, and iron bars 110 to 113 shillings. Steel rails, it is added, are also sold in some cases below the fixed price of £6. A later dispatch mentions reductions in the export prices of semi-finished steel material of 3 to 5 shillings a ton, making the new prices as follows: Slabs 99 to 101 shillings; billets 96 to 98 shillings, and blooms 94 to 96 shillings. On the other hand, the termination of the general strike has checked the downward tendency of home prices.

German reports continue to say that calls are being made for delivery in accordance with contract periods but that new orders are slow, and hence a steady reduction in the volume of work in hand is going on. This applies to products other than pig iron, steel material, rails, and ship plates. There is a prospect that work will soon grow scarce in bars, light and medium plates, tubes and structural shapes.

In semi-finished steel, complaints are no longer heard about delayed deliveries; but this change appears to be due rather to the increased supply through new mills in the Luxemburg-Lorraine district than to a shrinkage in the demand. In fact, the position of steel material remains favorable. The output of the mills for this quarter has about been taken. It is admitted that prices for export are receding.

#### Pig Iron Still Firm

Pig iron has suffered no abatement of its firm position. The furnaces are still producing at their full capacity, and iron is going into consumption as fast as produced. The demand for scrap also continues active, and prices are holding their own; although considerable quantities of material are coming upon the market, they are readily absorbed. The ore trade remains unchanged. The Siegerland ore interests have renewed for three years their contract to supply the Silesian furnaces with ores.

While the price of bands has been maintained, the situation is evidently growing less favorable owing to the rise of outside competition. The Rhenish-Westphalian Band Iron Association has adhered to its price of 145 marks, net cash at Oberhausen; but new producers not connected with the association are selling at 5 to 7.50 marks below that price. It is doubtful whether it can maintain its price much longer, the more so as it has recently been compelled by Belgium competition to make concessions on foreign orders. The price of cold-rolled bands is nominally maintained, but the active competition of independents is compelling the association to give easier rates in some cases. There is a

prospect that the fate of the association will be decided about the end of the month.

In heavy plates, prices for remoter deliveries have weakened somewhat. While the mills are still supplied with work in light plates, the outlook for new orders is not regarded as good. The mills are bidding sharply for home orders, so that some sales at as low as 135 marks have been reported. The export business has grown more difficult, and concessions have to be made to meet foreign competition.

## Buffalo

BUFFALO, N. Y., May 13, 1913.

**Pig Iron.**—Sales have shown a slight increase as compared with last week, although the total of all grades does not aggregate over 8000 tons. Foundries are more or less hampered on account of inability to secure sufficient labor and report that operations could be conducted on a heavier basis if that trouble could be eliminated. Notwithstanding iron is going forward from furnaces on contracts in good volume. Prices remain the same as last week. We quote as follows for delivery during current quarter and over last half, f.o.b. Buffalo:

| | |
|---|---|
| No. 1 foundry | $15.75 to $16.00 |
| No. 2 X foundry | 15.50 to 15.75 |
| No. 2 plain | 15.50 |
| No. 3 foundry | 15.25 to 15.50 |
| Gray forge | 15.25 |
| Malleable | 16.00 |
| Basic | 16.25 to 17.00 |
| Charcoal, regular brands and analysis | 18.00 to 19.00 |

**Finished Iron and Steel.**—Some interests report that new specifications are coming in at about 70 per cent. of mill capacity and if this rate is maintained, taking into consideration the tonnage already on mill books, it will mean full operation of the mills for the remainder of the year. The only cancellations noted are small amounts by agricultural implement people, who had to buy from warehouse stocks because of mills' inability to deliver in time. Agencies of the smaller Eastern mills are continuing to take 30-day delivery business at 1.50c. base for plates and shapes. Apparently buyers of bar material generally are averse to contracting for any large tonnages until mills are in shape to make 60 to 90-day deliveries. Bar iron specifications are better than for a week or two past. Wrought pipe specifications are also reported improved. Business in black and galvanized sheets continues good with four to six weeks' deliveries. Fair demand is noted in bolts and rivets with prices in these lines somewhat easier. In structural material competition is growing somewhat keener. There is, however, a large amount of work on architects' boards that will soon be out for figuring. The American Bridge Company has 300 tons for the Manufacturers' & Traders' National Bank, Buffalo, the contract for erection being sublet to the Northern Steel Construction Company, Buffalo. The steel for the addition to the Buffalo Smelting Company's Works, 200 tons, is to be erected by the Buffalo Structural Steel Company. Eidlitz & Ross, New York City, were low bidders for the addition to the New York Telephone building, Rochester, 800 tons.

**Old Material.**—New business is slack and movement of material on existing contracts is slow. Dealers do not want to take on orders at present prices and are holding back anticipating improved demand and better prices in the near future. Current prices remain practically unchanged from last week's figures. We quote as follows per gross ton, f.o.b. Buffalo:

| | |
|---|---|
| Heavy melting steel | $12.00 to $12.75 |
| Boiler plate, sheared | 15.00 to 15.50 |
| No. 1 busheling scrap | 11.50 to 12.00 |
| No. 2 busheling scrap | 9.00 to 9.50 |
| Low phosphorus steel | 17.00 to 17.50 |
| Old iron rails | 15.00 to 15.50 |
| No. 1 railroad wrought | 14.00 to 14.50 |
| No. 1 railroad and machinery cast scrap | 13.75 to 14.25 |
| Old steel axles | 17.50 to 18.00 |
| Old iron axles | 24.00 to 24.50 |
| Old carwheels | 15.00 to 15.50 |
| Railroad malleable | 13.25 to 13.75 |
| Locomotive grate bars | 10.50 to 11.00 |
| Stove plate (net ton) | 9.75 to 10.00 |
| Wrought pipe | 10.00 to 10.50 |
| Wrought iron and soft steel turnings | 7.00 to 7.50 |
| Clean cast borings | 8.00 to 8.50 |
| Bundled tin scrap | 17.00 |

The Art Metal Construction Company, whose home office and factories are at Jamestown, N. Y., has removed its New York offices and salesrooms to the fourteenth floor of the Woolworth Building, Broadway and Park place.

## New York

NEW YORK, May 14, 1913.

**Pig Iron.**—Lots of 100 tons are about all that are heard of in pig iron sales, though one or two inquiries of fair size have come in from consumers who inquired some time ago and dropped out in expectation of the lower prices which have since come. There is no evidence of general interest on the part of foundries. While the scale of consumption is pointed to as a favorable indication the extent of interruptions to shipments because of strikes at foundries is sufficient to cause comment. In the Lehigh Valley a possibility of interruption to coke production arose in the past week because of restlessness of labor, but the matter was adjusted. As a precaution several hundred cars of prompt coke were bought. Prices obtained on the small amount of iron that is represented in new purchases depend largely on the courage of the seller, and there is the seeming paradox of business being done at from 25 to 50 cents above what has been considered the minimum, while quotations at the supposed minimum or lower have driven off business. From all indications the trade may drift on several weeks more before there is buying of a sort to give character to the market. The tendency of prices is to a lower level and transactions in Southern iron in other markets have been on a basis enough below $12 at Birmingham for No. 2 foundry to compel further cuts in Eastern iron, if the Southern prices are to be met. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $17.50 to $17.75; No. 2 X, $16.75 to $17.25; No. 2 plain, $16.50 to $16.75. Southern iron is quoted at $17.50 to $17.75 for No. 1 foundry and $16.75 to $17.25 for No. 2.

**Structural Material.**—New demand is quiet and, while there is no quotable change in prices, the market is soft. Deliveries may be obtained readily for different periods, depending on the structural mill concerned, and 1.50c., Pittsburgh, is easily obtained, except perhaps for more prompt delivery, when 1.60c., Pittsburgh, is asked. For attractive offerings, delivered in say two months, 1.45c., Pittsburgh, can undoubtedly be done. There are some small offerings from the railroads but not much in business building projects. The awards of the week include 750 tons for a loft at Madison avenue and Sixteenth street; 900 tons in two other buildings in New York. Quotations for mill shipments are 1.61c. to 1.66c., New York, depending largely on the time of delivery, and higher prices than these have practically disappeared. The warehouse price is 2.15c.

**Plates.**—Rumors that Eastern mills are meeting prompt delivery demands on a basis of 1.50c., Pittsburgh, could not be substantiated, but instead considerable business was noted going on four weeks' shipment at 1.60c., Pittsburgh. Export quotations have, however, been made below even 1.50c.; in a case of 800 tons the prices ranged from 1.50c., Pittsburgh, for delivery in four to seven weeks, to prices about $1 a ton lower for delivery, beginning in about two weeks. We quote 1.61c. to 1.66c., New York, for mill shipment in the last half, and 1.76c., New York, for delivery in two to four weeks.

**Bars.**—Specifications on contracts have not increased in volume, nor has there been any change in the volume of new inquiry, though the generally urgent character of the latter has resulted in several mills being forced to decline the business owing to the impossibility of meeting shipment dates. There are indications that some consumers, particularly jobbers, having completed their heavy specification of material purchased at lower levels, are now prospecting to ascertain where most satisfactory deliveries can be obtained, the price quotations being identical among the mills. The change from the practice of specifying far in the future is more marked and accounts in part for the reduction in specifications in the last two months. In short, consumers have no desire to cover as far ahead as January or February of next year. Bar iron mills are catching up in manufactured products, except perhaps in machine bolts, and the bar iron market is softer. Quotations have been made on carload lots of refined iron at 1.50c. and 1.55c., at mill, and one case is learned of a quotation of 1.47c. at mill. We quote bar iron, therefore, at 1.60c. to 1.65c., New York, while steel bars remain at 1.56c. for delivery four months. Store prices are 2.05c. for steel bars and 2.10c. for iron bars.

**Cast Iron Pipe.**—Lowell, Mass., opens bids May 15 for 1125 tons of principally 24's. Fitchburg, Mass., on the same day, opens bids from contractors who will require a considerable quantity of pipe ranging from 4 to 36's. John Fox & Co., of this city, have secured from the contractor an order for the high pressure pipe for

the second section of the extension to the New York City system calling for 500 to 600 tons. Private buying shows no increase in volume. While competition is keen for contracts involving any considerable quantity, prices of carload lots of 6-in. at tidewater, New York, are still held at $23 to $24 per net ton.

**Old Material.**—Heavy melting steel scrap shows no life. Some of the steel companies in eastern Pennsylvania profess willingness to take moderate quantities at $12.25 delivered, while others say they will not pay over $11.75. These figures offer no inducement to holders of steel scrap in this vicinity. Small sales of wrought scrap, wrought pipe and cast scrap have been made, but the volume of business has been small. Dealers are expecting further declines in view of the refusal of consumers to purchase offerings of other products at prices considerably under those recently prevailing. Dealers' quotations are nominal, but are about as follows, per gross ton, New York and vicinity:

| | |
|---|---|
| Old girder and T rails for melting | $10.00 to $10.50 |
| Heavy melting steel scrap | 10.00 to 10.50 |
| Relaying rails | 22.00 to 22.50 |
| Rerolling rails | 13.00 to 13.50 |
| Iron car axles | 23.00 to 23.50 |
| Old steel car axles | 14.75 to 15.25 |
| No. 1 railroad wrought | 12.75 to 13.25 |
| Wrought-iron track scrap | 11.75 to 12.25 |
| No. 1 yard wrought, long | 11.50 to 12.00 |
| No. 1 yard wrought, short | 10.50 to 11.00 |
| Light iron | 4.50 to 5.00 |
| Cast borings | 7.00 to 7.50 |
| Wrought turnings | 7.00 to 7.50 |
| Wrought pipe | 10.00 to 10.50 |
| Old carwheels | 13.00 to 13.50 |
| No. 1 heavy cast broken up | 11.00 to 11.50 |
| Stove plate | 8.75 to 9.25 |
| Locomotive grate bars | 8.00 to 8.50 |
| Malleable cast | 11.00 to 11.50 |

**Ferroalloys.**—Inquiry for 80 per cent. ferromanganese continues light. With the principal agencies, $61, Baltimore, is the nominal quotation, but sales of small lots of spot have been made as low as $59, Baltimore, according to report. These sales are credited to merchants whose stock is limited. The large agencies have so far refused to sell at concessions. Ferrosilicon, 50 per cent., is unchanged at $75, Pittsburgh, for carloads, $74 for 100 tons and $73 for 600 tons or over. Inquiry is limited to a few carload lots.

# Metal Market

NEW YORK, May 14, 1913.

### The Week's Prices

Cents Per Pound for Early Delivery.

| | Copper, New York. | | | Lead | | Spelter | |
|---|---|---|---|---|---|---|---|
| | | Electro- | Tin, | New | St. | New | St. |
| May | Lake. | lytic. | New York. | York. | Louis. | York. | Louis. |
| 8 | 16.00 | 15.62½ | 50.30 | 4.35 | 4.20 | 5.50 | 5.35 |
| 9 | 16.00 | 15.62½ | 50.00 | 4.35 | 4.20 | 5.50 | 5.35 |
| 10 | 16.00 | 15.75 | ..... | 4.35 | 4.20 | 5.50 | 5.35 |
| 12 | 16.00 | 15.75 | 50.00 | 4.35 | 4.20 | 5.50 | 5.35 |
| 13 | 16.00 | 15.75 | 50.00 | 4.35 | 4.20 | 5.50 | 5.35 |
| 14 | 16.00 | 15.75 | 49.62½ | 4.35 | 4.20 | 5.50 | 5.35 |

Copper is higher and closely held. The demand for tin is light and the price is still below the current import cost. The demand for lead is slightly improved, with prices unchanged. Spelter is dull. Antimony continues lifeless.

### New York

**Copper.**—The favorable statement of the Copper Producers' Association, issued May 8, showing a reduction in stocks of well over 28,000,000 lb. and also that deliveries to Europe had been exceptionally heavy, brought about better buying on May 9 and 10 and caused an advance in electrolytic on the latter day when the price went up ⅛c. to 15.75c., cash, New York, or 15.87½c., 30 days, delivered. The buying was not heavy, inasmuch as buyers already were well booked. While Europe has taken a good deal of the metal, as the statistics show, it is felt that there still is need for a great deal more copper abroad and that domestic requirements in June will need more than is under contract. Lake copper for early delivery is difficult to secure, but deliveries further off can be easily negotiated at 16c. There is little resale copper on the market and it is closely held. Spot copper in London this morning is quoted at £69 17s. 6d. and futures £69 15s. The exports this month have been 16,475 tons.

**Pig Tin.**—The expectation of the tin trade that prices would get back to the import cost in the last few days has not been realized and it is frankly said that the course of the market has been disappointing, both as to price and extent of activity. The lack of demand and the desire of importers to get all they could of the little business stirring have been influences in keeping prices under the import cost which to-day is a little over 50c. The demand of the last few days has been light, but a little better than that of the week previous. Consumers are using plenty of tin but it is being delivered to them against old contracts. The quotation in New York this morning was 49.62½c. The opening quotations in London to-day were £227 10s. for spot and £219 15s. for futures. The arrivals this month total 1947 tons and there is afloat 1195 tons.

**Lead.**—There has been no decided change, although inquiry is a little better for carload lots wanted for quick delivery. Inquiries for large lots are extremely scarce. The trade was a little upset by the recent action of the American Smelting & Refining Company in reducing its prices and is inclined to await developments. The price of lead in New York to-day is 4.35c., and in St. Louis 4.20c.

**Spelter.**—The market is dull and devoid of interesting features. Prices are nominal at 5.50c. to 5.55c., New York, and 5.35c. to 5.40c. St. Louis.

**Antimony.**—Quotations are nominal at 8.25c. to 8.50c. for Hallett's, 8.75c. to 9c. for Cookson's and 7.50c. to 7.62½c. for Chinese and Hungarian grades. The metal continues to be offered at below import cost with little or no demand.

**Old Metals.**—The demand continues fair. Dealers' selling prices are unchanged as follows:

| | Cents per lb. |
|---|---|
| Copper, heavy and crucible | 15.00 to 15.25 |
| Copper, heavy and wire | 14.75 to 15.00 |
| Copper, light and bottoms | 13.25 to 13.50 |
| Brass, heavy | 9.75 to 10.00 |
| Brass, light | 8.25 to 8.50 |
| Heavy machine composition | 13.75 to 14.00 |
| Clean brass turnings | 9.00 to 9.25 |
| Composition turnings | 11.50 to 12.50 |
| Lead, heavy | 4.25 |
| Lead, tea | 4.00 |
| Zinc, scrap | 4.50 |

### Chicago

MAY 12.—The buying of copper for consumption in the past several days has aggregated a substantial total, and with this support the copper market has assumed a strong position, with fractionally higher prices. On the contrary, lead values have fallen off from the higher level of a week ago. In spelter, exact quotations are difficult to represent by any one price because of the wide variation, though the general situation is approximately the same as last reported. In sympathy with the higher values in the new metal, scrap copper is bringing slightly better offers from dealers. We quote as follows: Casting copper, 15.75c.; Lake, 16c. in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 51c., small lots, 53c.; lead, desilverized, 4.35c. to 4.40c.; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.50c. to 5.60c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is $7.75, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14c., copper bottoms, 12.75c.; copper clips, 13.50c.; red brass, 12.75c.; yellow brass, 9.50c.; lead pipe, 3.90c.; zinc, 4.35c; pewter, No 1, 33c.; tinfoil, 38c.; block tin pipe, 44c.

### St. Louis

MAY 12.—Some weakening has occurred in both lead and spelter, the last quotation on lead being 4.25c. and on spelter 5.35c. Copper was better at the closing today, standing at 16.22½c. for electrolytic and 16.35c. for Lake. Tin was firm at 50.30c. to 50.60c. Hallett's antimony showed no change, the quotation being 9.10c. to 9.35c. In the Joplin ore market the top price of zinc ore only reached $46.50 per ton for the choicest lots, while the basis price for 60 per cent. was $43.50. The range was down to $40 for the lower grades. Calamine was in fair demand on a basis price of $19 for 40 per cent., but the choicest lots brought as high as $23. Lead ore was weaker at $52.50 for 80 per cent. On miscellaneous scrap metals we quote as follows; Light brass, 6c.; heavy brass and light copper, 9.50c.; heavy copper and copper wire, 11c.; pewter, 25c.; tinfoil, 34c.; zinc, 3.50c.; lead, 3.50c.; tea lead, 3c.

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The Development & Finding Company, Niagara Falls, N. Y., has ordered from Root, Neal & Co., Buffalo agents of the Dodge Mfg. Company, a 1000-hp. rope drive to be used from engine to generator. A 132-in. engine wheel and 48-in. generator wheel will be used on the job, together with 2100 ft. of Firmus transmission rope in 40 wraps.

## Iron and Industrial Stocks

NEW YORK, May 14, 1913.

The stock market has been apathetic, with most prices inclined to lower levels. The range of prices on active iron and industrial stocks, from Wednesday of last week to Tuesday of this week, was as follows:

| | | | |
|---|---|---|---|
| Am. Can, com..... | 31¾- 33⅜ | Pressed Steel, com.. | 24⅜- 25¼ |
| Am. Can, pref..... | 91½- 94 | Railway Spring, com..... | 27¼ |
| Am. Car & Fdy., com. | 47⅞- 49¾ | Republic, com. ..... | 23 - 23⅜ |
| Am. Car & Fdy., pref. | 113⅞-114½ | Republic, pref..... | 81¾- 82 |
| Am. Loco., com.... | 32 - 34 | Rumely Co., com... | 25¼- 30 |
| Am. Loco., pref..... | 103 | Rumely Co., pref... | 54⅜- 58¼ |
| Am. Steel Foundries..... | 32 | Sloss, com..... | 31 |
| Bald. Loco., com..... | 46 | Pipe, com. ..... | 12½- 13⅞ |
| Bald. Loco., pref..... | 104½ | Pipe, pref. ..... | 48 - 48½ |
| Beth. Steel, com.... | 32⅛- 33½ | U. S. Steel, com.... | 59 - 60¾ |
| Beth. Steel, pref..... | 69⅛ | U. S. Steel, pref.... | 105½-106¾ |
| Case (J. I.), pref..... | 99½ | Va. I. C. & Coke... | 43 - 45 |
| Colorado Fuel ..... | 31 - 32 | Westinghouse Elec. | 61 - 62 |
| Deere & Co., pref... | 97 - 98⅜ | Am. Ship, com..... | 51 |
| General Electric .... | 137½-138½ | Am. Ship, pref..... | 100¼ |
| Gr. N. Ore Cert.... | 32¼- 34 | Cambria Steel ..... | 47½- 48⅜ |
| Int. Harv., pref., new. | 111 -111½ | Lake Sup. Corp.... | 26½- 27 |
| Int. Harv., Corp..... | 104⅞ | Pa. Steel, pref..... | 65 - 68 |
| Int. Harv., Corp., pf. | 111 -113½ | Crucible Steel, com. | 13⅝- 13⅞ |
| Int. Pump, com..... | 6¼- 8 | Crucible Steel, pref. | 87½- 88⅜ |
| Int. Pump, pf..... | 30⅝- 31½ | La Belle Iron, com.. | 44 - 46¼ |
| Nat. En. & St., com..... | 12½ | La Belle Iron, pref..... | 123 |
| Nat. En. & St., pref. | 82 - 84 | | |

Referring to the recent increase in the common stock of the Youngstown Sheet & Tube Company from $10,000,000 to $20,000,000, President James A. Campbell states that the directors will probably declare a stock dividend of $5,000,000, which will be paid out of the surplus or undivided profit account, reducing it from $11,000,000 to $6,000,000. Additional common stock will be sold from time to time as the company requires more capital, but no sales of common stock will be made at this time.

### Dividends Declared

The Pratt & Whitney Company, regular quarterly, 1½ per cent. on the preferred stock, payable May 15.

The Underwood Typewriter Company, regular quarterly, 1 per cent on the common stock and 1¾ per cent. on the preferred stock, both payable July 1.

Deere & Co., regular quarterly, 1¾ per cent. on the preferred stock, payable June 1.

The Studebaker Corporation, regular quarterly, 1¾ per cent., on the preferred stock, payable June 2.

The Niles-Bement-Pond Company, regular quarterly, 1½ per cent., on the preferred stock, payable May 15. The dividend on the common stock was passed for two reasons: 1. The impossibility of predicting the exact effect of new tariff legislation which imposes caution in distribution of earnings until such time as the outcome shall be more definitely known. 2. The suggestion of conservatism because of loss suffered at the Niles plant at Hamilton, Ohio, March 25 to 27, when the property was flooded and manufacturing there necessarily stopped for some weeks.

The M. Rumely Company has suspended for the present the payment of dividends on the preferred stock.

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The Empire Steel & Iron Company has decided to close down its Mt. Hope iron mines near Dover, N. J., where the most of the employees have been on a strike for several weeks. The strikers had succeeded in tying up the Mt. Hope Mineral Railroad, which also hauls ore from the nearby Richard mine of the Thomas Iron Company. It was expected that the railroad would resume operations this week, but there will be further delay as the line was dynamited Monday night by strikers and sections of the track destroyed.

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The Pullman Automatic Ventilator Mfg. Company, York, Pa., takes much satisfaction in having filled an important Canadian order. The order was for a carload of roof ventilators which went to Toronto. The manufacturers paid a Canadian duty of 30 per cent. in addition to the freight, representing probably that much more than the cost of ventilators manufactured in Toronto, which is taken as a high testimonial to the desirable features of the Pullman product.

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The Chicago Steel Products Company, Chicago, has opened a downtown sales office at 1117 Monadnock Building, in charge of J. C. Fruit, manager of sales.

## Personal

H. H. Joes, who for the past three years has been connected with the Pittsburgh office of the Charles Dreifus Company, iron and steel scrap merchant, has been transferred to the company's Philadelphia office.

E. C. Sattley, Page Woven Wire Fence Company, Monessen, Pa., will be the next president of the Traffic Club of Pittsburgh. The election will be held in June.

T. N. Johnson, formerly associated with the United States Cast Iron Pipe & Foundry Company, has been appointed to succeed E. A. Kebler in charge of the Chicago office of the Massillon Iron & Steel Company, Rookery Building.

D. T. Croxton, president Cleveland Furnace Company, Cleveland, Ohio, has gone to Panama for a three weeks' vacation.

J. R. Haldeman corrects the statement which appeared on page 1152 of *The Iron Age* of May 8, in connection with the appointment of a receiver for the Lancaster Foundry Company, that he has been the manager of that company. He is general manager of the U. S. Lock & Hardware Company, Columbia, Pa., and not of the Lancaster Foundry Company. The manager of the latter company at the time of its failure was Aaron B. Hess.

Vice-President D. G. Kerr, of the United States Steel Corporation, Thomas Morrison, D. M. Clemson and G. M. Shiras, Pittsburgh, visited the Steel Corporation's iron mines on the Mesaba and Vermillion ranges in Minnesota in the past week.

George S. Griscom has been appointed representative of the Riter-Conley Mfg. Company, Pittsburgh, in London, England.

W. S. Chase, general sales manager of the National-Acme Mfg. Company, Cleveland, Ohio, left last week for Idaho, where he will remain until September.

H. T. Latto, who has been with the National-Acme Mfg. Company for several years, in the sales department, has been appointed Eastern sales manager, to succeed L. M. Waite. Mr. Latto will have charge of the Eastern office and warehouse at 77 White street, New York, after the middle of May, and will direct the work of the company's sales organization in eastern Pennsylvania, eastern New York, New Jersey, Maryland, Delaware and Virginia.

Dr. Charles P. Neill, commissioner of labor, has tendered his resignation to President Wilson and will become head of the newly created labor department of the American Smelting & Refining Company. He will assist in establishing a pension system and compensation system. The company will carry on general welfare work on a large scale.

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According to the figures published annually by Herr. Schuster, of Witkowitz, the production of steel ingots and semi-finished steel in 1912 in Austria-Hungary was 2,785,105 metric tons, an increase of 349,348 tons over 1911. Of this total, open hearth steel contributed 81.1 per cent.; basic Bessemer steel, 12.5 per cent.; acid Bessemer steel, 1.9 per cent.; puddled iron, 2.2 per cent.; crucible steel, 0.9 per cent.; electric steel, 0.8 per cent.; puddled steel, 0.6 per cent.

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The monthly meeting of the Newark Foundrymen's Association, Newark, N. J., May 7, was addressed by Robert W. Bonynge, ex-member of Congress from Colorado and a member of the National Monetary Commission, whose subject was "A Sound Banking System." The meeting was also the annual one and the election of officers resulted in the continuance in office of all of those who served the previous year.

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The Niagara Machine & Tool Works, 639 Northland avenue, Buffalo, N. Y., is offering $200 in prizes for the best suggestions submitted regarding new useful machines and tools for sheet metal workers or as to improvements in existing ones. The prizes in the contest, which will close November 1, 1913, are: First, $100; second, $40; third, $25; fourth, $15, and two prizes of $10 each.

## Obituary

### James C. Bayles

James C. Bayles, editor of *The Iron Age* from 1870 to 1880, died from pneumonia, in the New York Medical College Hospital, New York City, May 7. He was born in the city of New York July 3, 1845, and obtained his early education in the public schools. In 1862 he enlisted for three months in the Twenty-second Regiment of New York. At the expiration of that short term of service he decided to re-enlist, and without letters of any kind applied to Gov. R. E. Fenton for a commission and was made a second lieutenant of artillery, and later was raised to the rank of first lieutenant. He served for eighteen months. After a year's illness he obtained employment with the Delamater Iron Works of New York, and soon after that joined the engineering staff of the Raritan & Delaware Bay Railroad.

In 1865 Mr. Bayles became associated with Gen. Charles G. Halpin, proprietor of the New York Citizen, and during the illness of Gen. Halpin assumed charge of the newspaper as editor. In 1868 and 1869 Mr. Bayles was editor of the Commercial Bulletin, from which he resigned in 1870 to accept the editorship of *The Iron Age*. While filling that position he also became the first editor of the Metal Worker, which was founded in 1874, and had editorial charge of that paper for a number of years. He was president of the American Institute of Mining Engineers in 1884-5. He became much interested in sanitation and hygiene, was the author of a book on house drainage, and when Abram S. Hewitt was mayor of New York, in 1887, he appointed Mr. Bayles president of the Board of Health, in which capacity he served with high credit.

After retiring from *The Iron Age* he engaged in manufacturing, but his ventures were unsuccessful and he became a member of the editorial staff of the New York Times and served in that capacity for several years, subsequently engaging in business as a consulting engineer. He received the degree of Ph.D. from Rutgers College and was the recipient of many other honors. He was a man of marked ability and versatility, a brilliant writer and an accomplished speaker. His wife died in 1905. His sons, Lewis P. Bayles and Howard Bayles, are both engineers. The former lives in Easton, Pa., and the latter is a mining engineer in Chile.

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FREDERICK N. GARDNER, president Gardner Machine Company, Beloit, Wis., died May 11 of pneumonia, aged 63 years. Mr. Gardner had been in business in Beloit for twenty-five years. He organized the Gardner Machine Company in 1905. Previous to that time he was manager of Charles H. Besly & Co. at Beloit.

ROBERT W. SAYLES, member of the staff of Charles W. Leavitt, Jr., at 220 Broadway, New York, died May 7, at Montclair, N. J., after an operation, aged 59 years. He became a member of the Leavitt staff 16 years ago, shortly after which he was made principal assistant engineer. He was a member of the American Society of Civil Engineers.

JAMES R. HUBER, Western sales representative of Lumen Bearing Company, Buffalo, died from pneumonia at his home in Detroit, Mich., May 8.

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The prospects of the early development of the iron and copper industries in the Ural district of Russia are brighter according to the recent Ural Industrial Congress held at St. Petersburg, because of the commencement of coal mining operations in the Kuznetsk district of Siberia. A supply of good coking coal exists there, producing a coke cheaper than that imported from England or secured from the Donetz district. The realization of these prospects is expected in part by the end of this year. The supply, however, will not be large until the completion of the Altai Railway, in three years.

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The name of Corey, Ala., where the great new wire mill of the American Steel & Wire Company, is located, has been changed to Fairfield. The probability of the completion of the plant and the inauguration of manufacturing operations there is regarded as stronger than in some time as the result of consultations with Attorney-General McReynolds, Judge E. H. Gary and others by Birmingham industrial and financial interests.

## The Refractories Manufacturers' Association

Reference has already been made in these columns to the organization of fire brick manufacturers effected at a meeting held in Pittsburgh, April 22. In its plans the new organization is similar in many respects to those maintained in a number of industries. Any individual or company engaged in the manufacture of refractories is eligible to membership and it is the expectation that the roll of the new Refractories Manufacturers' Association will eventually contain the names of every prominent member of the trade. The purpose of the organization is stated to be "to promote closer relations between manufacturers, dealers and consumers of all kinds of refractories; to improve the products of its members; to standardize, as far as possible, the various designs and shapes of products manufactured; to endeavor to secure the most equitable freight rates for manufacturers and consumers, and to promote social intercourse among its members." It is the intention to secure some of the most prominent ceramic experts, engineers and manufacturers in the country to make addresses at the regular meetings.

H. D. Savage, Ashland Fire Brick Company, Ashland, Ky., has been elected president and John H. Cavender, American Refractories Company, Chicago, secretary and treasurer. The executive committee is composed of the following:

Missouri—J. L. Green, Laclede-Christy Clay Products Company, St. Louis, Mo.

Illinois—C. S. Reed, Chicago Retort & Fire Brick Company, Chicago, Ill.

Kentucky—E. S. Hitchens, General Refractories Company, Olive Hill, Ky.

Southern Ohio—D. D. Davis, Davis Fire Brick Company, Oak Hill, Ohio.

Northern Ohio—T. E. Thomas, Niles Fire Brick Company, Niles, Ohio.

Western Pennsylvania and West Virginia—J. H. McFeely, McFeely Brick Company, Pittsburgh, Pa.

Central Pennsylvania—Geo. H. Diack, Queens Run Fire Brick Company, Lock Haven, Pa.

Maryland—C. H. Claiborne, Union Mining Company, Mt. Savage, Md.

New Jersey and New England—Cyrus Borgner, Cyrus Borgner Company, Philadelphia.

The association will hold its next meeting in Pittsburgh May 20, and an interesting programme is being arranged. It is the purpose of the organizers to make the association of benefit to the manufacturer and consumer, not only in such matters as the improvement of the quality and character of product, but also in working out and putting into effect efficient methods of manufacture, reduction of costs and standardization. Ultimately the association may establish its own testing laboratory.

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The American Shipbuilding Company has taken a contract from Canadian interests for a bulk freight lake boat for the grain trade between the Canadian head of the lakes and Buffalo. This boat will be 625 ft. long, or 8 ft. longer than any of the present lake freighters. It will be 5 ft. narrower and have 1 ft. less depth than the largest ore boats, so that its gross tonnage will be slightly less than that of such boats. It will be built on the Isherwood system at the yard of the Western Shipbuilding & Dry Dock Company, Port Arthur, Ont., a subsidiary of the American Shipbuilding Company.

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India has begun to ship pig iron to this country. It is stated that a sailing vessel laden with about 2500 tons of pig iron shipped by the Tata Iron & Steel Company, Sakchi, India, is now on the high seas bound for the Pacific coast, consigned to one of the mills. Several shipments of Chinese pig iron have been made to this country within the past few years, but this is the first from India.

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The new Western plant at East Chicago, Ind., of the Champion Rivet Company, Cleveland, Ohio, is practically completed and will be placed in operation about June 1. The company will supply its Western trade from this plant.

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Corrigan, McKinney & Co., Cleveland, Ohio, have placed a contract with the Pennsylvania Engineering Works, New Castle, Pa., for a 1000-ton hot-metal mixer for their new steel plant.

## Pittsburgh and Vicinity Business Notes

At the annual meeting of stockholders of the Pressed Radiator Company held in its offices in the Bailey-Farrell Building, Pittsburgh, last week, the following directors were elected: R. B. Mellon, A. W. Mellon, Frederick C. Perkins, John K. Frye, H. C. Shaw, H. A. Phillips and John W. Garland. At the directors' meeting the following officers were elected: John K. Frye, president; Frederick C. Perkins, vice-president; H. C. Shaw, treasurer, and A. M. Pearson, secretary and assistant treasurer.

The Valley Foundry Company, Canal Dover, Ohio, has filed a voluntary petition in bankruptcy in the Federal courts at Cleveland. The company was organized two years ago, and made a specialty of small iron castings for repairing machinery.

The Brier Hill Iron & Coal Company, Youngstown, Ohio, one of the concerns merged into the Brier Hill Steel Company, has filed notice of a decrease in its capital stock from $500,000 to $50,000.

The Weirton Plate, Structural & Construction Company has been organized with a capital stock of $25,000 to build a plant at Weirton, W. Va., for the manufacture of heating and annealing furnaces, gas producers and tin house stacks. The main building will be 200 x 450 ft. Alfred Tompkins, Pittsburgh, is president and C. B. Chaney is secretary and treasurer.

The Heppenstall Forge & Knife Company, Pittsburgh, has purchased considerable ground adjacent to its plant to be used for future extensions.

The cement plant of the Struthers Furnace Company at Struthers, Ohio, was started recently, having been idle since last September. It was scheduled to start early in the spring, but the March floods damaged some of the machinery, which had to be replaced.

The Bessemer & Lake Erie Railroad, operated and controlled by the Carnegie Steel Company has placed an order for four passenger and eight freight engines with the American Locomotive Company.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has started two furnaces in its new open hearth plant. A third is scheduled to start about June 1 and the other three about July 1. Sufficient soaking pit capacity for heating ingots will not be completed until the latter date. In reference to the recently reported sale of 10,000 tons of sheet bars for prompt delivery at $26.50, it is stated that the sale was not made by this company. It has no sheet bars to offer for second quarter, but has sold practically its entire capacity for the last half of the year at a higher price than that.

The Riter-Conley Mfg. Company, Pittsburgh, has received contracts from the Colorado Fuel & Iron Company for 1800 tons of steel for additional buildings for the open hearth plant at Pueblo; for plate work for a 600-ton metal mixer to be built by the Mesta Machine Company, Pittsburgh; for structural steel for a pump house at Pearl Harbor, Hawaii, for the United States Government, and will soon begin work on a contract for a steel building, 79 x 320 ft., and four storage tanks for the Electric Carbon Company, Massena Springs, N. Y.

The Greensburg Coal Company, Greensburg, Pa., has placed a contract with the William B. Scaife & Sons Company, Pittsburgh, for structural steel head frames, together with a number of plate steel tanks.

The United States Geological Survey recently issued a report on radium, in which it was stated that while two-thirds or more of the supply of the world has been produced from American radium bearing ores, this country does not make or market any radium of its own. This statement is denied by Joseph M. Flannery, president Standard Chemical Company, Pittsburgh, who says: "We have acquired about 100 mining claims in the Paradox Valley, Col., which contain some of the richest radium bearing ore deposits found anywhere. Our mining operations yield an output of 150 tons of carnotite ore per month. This ore we ship to our reduction mill at Canonsburg, Pa. The radium values we then bring to our laboratories in this city for further refining the radium, which now amounts to about 1 gram per month."

At the bi-monthly wage settlement for puddlers and finishers employed in Western bar iron mills that sign the Amalgamated Association scale, held in Youngstown, Ohio, on Tuesday, May 13, it was found that the average price on shipments of iron bars in March and April was 1.50c. at mill. This entitles the puddlers to $6.75 per ton for boiling for May and June, while finishers get an advance of about 2 per cent. This is the highest puddling rate for about six years.

John Williams, president of the Amalgamated Association of Iron, Steel and Tin Workers, now in session at Fort Wayne, Ind., states that the membership nearly doubled in the past year, now numbering close to 8000 members. It is reported that a demand will be made for a higher rate for puddling for the year beginning July 1.

No. 4 Eliza furnace of the Jones & Laughlin Steel Company, has been blown out for relining and repairs and will be idle a month or six weeks.

The plant of the Superior Steel Company at Carnegie, Pa., is partially idle on account of a strike which may possibly be settled this week.

The Fort Pitt Spring Company, McKees Rocks, Pittsburgh, is enlarging its plant and will make elliptic springs of its own design. The additions include a new building, 50 x 175 ft., in which considerable new equipment will be installed.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has let a contract to the Hamilton-Kennedy Company, New York City, for changing the channel of the Mahoning River near its East Youngstown mills, by which a considerable acreage will be secured for future extensions. The work is expected to be finished about September 1.

The Leetonia Steel Company, Pittsburgh, now building an open hearth steel plant at Leetonia, Ohio, placed a contract last week with the Pittsburgh office of the Babcock & Wilcox Company for two 600-hp. Sterling water tube boilers. Contracts for the steel buildings to house the open hearth plant will probably be placed this week. McKeefrey blast furnace owned by this company is now being relined and is expected to be ready for blast about June 15. It has not yet been decided what kind of iron the furnace will make.

The Cambria Steel Company will open a district sales office in Detroit, Mich., in charge of L. H. Carlisle, now connected with the home office of the company at Johnstown, Pa. Heretofore the business of the Michigan territory has been handled through the Cleveland office, with J. D. W. Snowden as resident salesman, located in Detroit. Mr. Snowden will be transferred to Cleveland and look after a portion of the Ohio territory.

The Weirton mills of the Phillips Sheet & Tin Plate Company, Weirton, W. Va., have resumed operations after an idleness of about six weeks caused by the boiler house and power plant being damaged by a landslide. Extensive improvements have been made and the plant is again in good operating condition.

The Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, is running to capacity. Business booked consists almost without exception of small and medium sized contracts. Among recent orders are exhaust piping and a line of 2500 ft. of 12-in. compression air piping for the Vesta Coal Company; hydraulic piping for the Eastern Car & Foundry Company of Canada; 1400 ft. of 24-in. suction pipe for the Beaver County Light Company; welded air and gas valves and rotary gas scrubbers for the Pittsburgh Steel Company, and the valves for the blowing engine house and pumping plant of the Minnesota Steel Company, Duluth. A large contract is being filled for hydraulic valves and fittings for one of the new hydroelectric plants being installed by the Electric Bond & Share Company. The penstock valves for this plant are butterflies, cylinder operated, 11 ft. 6 in. in diameter, and several 6 ft. 6 in. butterflies. Among the high pressure material are some 450-lb. test fittings of cast steel 6 ft. in diameter, ranging up to 25 tons each in weight.

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In the automatic sampling of ore, time samplers are regarded as the best. They receive a falling stream of ore for a definite period of time. They are operated for a portion of the time as against that kind of sampler which attempts to divide the stream of ore and cut part of it all the time. This latter method is regarded by some as inaccurate because of lack of uniformity in the falling stream.

# The Corrosion of Iron and Steel*

BY WM. H. WALKER†

It is now six years since the electrolytic theory in its developed form was offered as a basis for the explanation of the corrosion of iron and steel, and it seems worth while at this time to inquire regarding the accuracy of some of the conclusions to which it has led, as viewed in the light of present experience.

### Factors Controlling Corrosion Not Simple

In the first place, we have found that the factors controlling the rapidity or extent of corrosion are by no means so simple as they were at first thought to be. Many conditions which were considered of little or no importance have been found to exert a profound influence upon the reactions involved. For example, samples of iron and steel which exhibit marked differences in corrosion exposed in the normal condition in which they came from the mill fail to show any difference upon exposure, when they are first planed to a uniform surface. Apparently, the mechanical strain to which the samples are subjected in the planer masks or neutralizes the difference in corrosion inherent in the normal material.

It is not surprising, therefore, that many conflicting results have been obtained and published from the investigators now interested in this work. Only those tests which have been carried on under identical conditions of surface finish, temperature, access of oxygen and moisture, general atmospheric conditions, etc., should be given any weight, and, even when the greatest care is taken, generalizations must be drawn with caution.

### Homogeneity Does Not Insure Protection

One of the conclusions reached by a consideration of the electrolytic theory of corrosion which has proved misleading is that homogeneity in the material insures protection, while heterogeneity leads to rapid attack. While this is a corollary which may be logically drawn from the electrolytic theory, and is doubtless in itself true, there are evidently other factors which superimpose themselves upon those due to differences in structure, producing a final effect contrary to that predicted. The iron of the old chain bridge at Newburyport, Mass., has withstood corrosion in a truly remarkable manner for the last 98 years, and yet it is conspicuous for its heterogeneous structure. Large areas of perfectly pure iron, free from both carbon and slag, are mixed up with areas showing at least two kinds of slag, and very high carbon; yet all withstand atmospheric corrosion.

On the other hand, Burgess has shown that iron free from all contaminating elements which could segregate or produce a lack of uniformity does not withstand rusting so well as the same iron to which has been added a little manganese, or copper, or nickel. This behavior is observed also in the case of the so-called pure irons made in an open-hearth furnace, and which are relatively free from carbon, manganese, sulphur, and other constituents prone to segregation, which have come to the writer's notice. While theoretically a very pure iron should withstand rust, there are apparently some factors present which more than offset any advantage inherent in purity. Obviously, conditions affecting the surface of the material so soon as rusting has started are important causes which have largely been overlooked and which demand more thorough investigation.

### Copper in Steel—Knowledge of Pigments

The most important advance in this field made in recent years is a knowledge of the effect of the addition of small amounts of copper to normal open-hearth or Bessemer steel. This result is most strikingly brought out in the paper of D. M. Buck published in full in *The Iron Age* of April 17. The present writer has within a week inspected with much interest the test roofs there described and can testify to the remarkable effect shown. While these tests do not show that any steel, however poorly made, will with the addition of copper withstand atmospheric corrosion, they prove that it is the copper and not the absence of manganese and other "impurities" which is the controlling factor. Several hypotheses have suggested themselves as explaining this marked effect of copper in causing steel to resist atmospheric corrosion, but as yet none is sufficiently tangible to afford a working theory.

Rapid progress has been made in acquiring that knowledge of the relation of pigments and finished paints to corrosion which is necessary to a better protection of iron and steel. Predictions founded on the theory that a basic paint, or one containing a chromate pigment, would inhibit rusting, while one made up from lamp-black or graphite would accelerate rusting have, in the main, been found correct. The effect of the pigment upon the character of the oil film making up the paint, however, has shown itself also to be very important. Many basic pigments, such as basic lead carbonate or zinc oxide, which in themselves inhibit, do not withstand the weather; lamp-black and graphite, on the other hand, make a very impervious and highly resistant paint film. The logical conclusion in protecting iron is, therefore, to use a basic priming coat, a second coat of a mixture of a basic pigment and a little lamp-black, and, when well dried out, to apply a lamp-black or graphite finishing coat. Experience has shown also the importance of brushing the paint well on the iron; a good paint may fail on account of poor application.

Careful tests with galvanized work show that an even coating of zinc is the all-important factor. The common practice of clean wiping galvanized ware is fatal to durability, since the protecting layer is not metallic zinc but a thin deposit of a zinc-iron alloy. While, therefore, much has been accomplished in the way of making a more resistant base, there is still a necessity for a uniform substantial coating of spelter over the surface.

*Abstract of paper presented before the Society of Chemical Industry, New York, April 25, 1913.

†Massachusetts Institute of Technology, research laboratory of applied chemistry.

## The New Ontario Blast Furnace

Work is well under way on the blast furnace the Canadian Furnace Company, Ltd., is building at Port Colborne, Ontario. The company is controlled by the Buffalo Union Furnace Company, Buffalo. It is expected that the furnace will be in operation late in July or early in August. It will produce the Victoria brand of pig iron in foundry, malleable and Bessemer grades, and will have a capacity of 300 to 350 tons a day. It is the intention to install a pig-casting machine in connection with the manufacture of basic iron for the Canadian trade. At the start the iron will be handled by a Brown pig breaker.

The furnace is 80 ft. x 19 ft. 6 in. and is equipped with three two-pass stoves, 85 x 20 ft. The boiler equipment consists of 2400 hp. of Wickes boilers and the blast will be furnished by high and low-pressure Allis-Chalmers vertical long crosshead engines of 84 in. diameter of blowing tub by 60-in. stroke. Electric power will be furnished by two 300-kw. General Electric turbines. Two 6-ton McMyler ore bridges will be operated on an adjoining dock of 600 ft. frontage on the Welland Canal, in which there is 23 ft. depth of water. It is the intention to add another stove and a high-pressure blowing engine at an early date. The product of the furnace will be sold by M. A. Hanna & Co., Cleveland.

Various plans have been used by the Cleveland Hardware Company, Cleveland, Ohio, to increase the personal interest of its employees in the organization. Among these is a custom established several years ago of celebrating the completion of a new building with an entertainment for its employees and their families. The company recently built a large addition to its No. 1 plant, and following out its custom it gave a dance in the new building on the evening of May 10. The entire top floor was used for dancing, and refreshments were served in the dining room of the old section of the plant adjoining. A musical programme was given in the latter room. That the employees appreciate these entertainments was shown by the large attendance, fully 1800 being present.

A cylindrical grinding machine weighing no less than 50 tons and, in the belief of its builder, the Norton Grinding Company, Worcester, Mass., the largest of its kind, was exhibited in operation in the works of the Norton Grinding Company on Wednesday, May 14. The machine was built for the Lorain works of the National Tube Company to grind rolls up to 40 in. in diameter.

## Steel Corporation Dissolution Suit

(Continued from page 1185)

catalogue, to pick up some business all the time and to search intelligently for new markets and new demands to supply.

Costs on export business have constantly decreased. The cost of export business to the Pittsburgh Wire Company had been from 7 to 11 per cent. and of the National Tube Company 8½ per cent. before the consolidation. During the first year of the Steel Products Company costs ran 3 per cent. of value, and the costs in proportion to values have since constantly decreased. They are now 8/10 of 1 per cent., and Mr. Farrell said he expected they would get down to ½ of 1 per cent.

### How Steamships Are Kept Under Charter

In the Steel Products Company's business steamers are kept under charter. Just now the number is 35. The trade with Mediterranean countries enabled the establishment of the American-Levant Line, to which the Steel Products Company gives a guaranteed amount of tonnage for each shipment. The company also has a line of its own which goes around the Horn and stops at places on the west coast of South America, Mexico, Vancouver, Victoria, and as far north as Prince Rupert—going to ports not reached by other lines from New York at all. There are four owned steamers and two chartered in this service. The company is extending the service to the use of other manufacturers. A full cargo is sent out every two months. The steamers come back from the Pacific loaded with lumber or other products. Often cargoes are taken on the way back to Europe, and then back to New York. Usual cargoes from Europe, to get the steamers back to New York loaded, are of chalk from England and tin plates from Wales. To show the necessity of having such a line of steamers, the needs of the Vancouver district can be taken. There light steel rails for lumber camps, sheet iron, and wire for winding wooden pipe are in demand. The regular charges from Pittsburgh are $18 and from Liverpool $6 to $7.

The Steel Products Company enjoys an advantage in that it offers a continuous service. Buyers do not readily patronize firms which are not able to supply them at all times. The Steel Products Company has had a long fight to live down the "dumping" idea. The company has constantly studied local demands and catered to them. The parent steel corporation has had mills specially changed to take care of particular export business. Australia wants oval nails, for instance, while many other countries would not take such a product.

### Constant Attention to Export Business

The Steel Corporation's policy has been one of constant attention to export business, said Mr. Farrell. This has been true, even when business in this country was at the highest. Other corporations pay attention to the foreign markets only when home markets are unusually dull. The Steel Corporation does 90 per cent. of the export business in its line from this country. Five mills are kept busy almost entirely on foreign business. In 1910 34,000 men were employed in manufacturing for foreign business, 37,000 in 1911 and about 40,000 men now.

The corporation has arrangements with other manufacturers whereby it gives special allowances to enable them to enter foreign fields. In this way $30,000,000 additional business in exporting is done, and this special work keeps 15,000 men busy.

The growth from 1910 to 1912 in the percentage of foreign business to total business of the different companies was as follows:

| | Per cent. |
|---|---|
| Carnegie | 21 to 24 |
| National Tube | 10 to 12 |
| American Sheet & Tin Plate | 11 to 20 |
| American Steel & Wire | 17 to 20 |
| Lorain | 30 to 30 |
| American Bridge | 6 to 8½ |
| Illinois | 1.2 to 2.4 |
| Tennessee Coal & Iron | 1 to 3 |

The corporation is spending a great deal of money to enable the Tennessee Coal, Iron & Railroad Company to export to greater advantage, especially through such ports as Pensacola. Before control of the Tennessee Company changed hands it exported only a little pig iron at various times.

Mr. Farrell stated that much difficulty is found in exporting to many countries because the banking and general financing were done by foreign bankers who aided manufacturers from their own countries to control trade. This is a matter that must constantly be dealt with.

Much material is bought from time to time by the Steel Corporation from competitors for use in foreign trade. For example, when a request for Cuban ore rails came, it was filled with rails from the Maryland Steel Company. Other cases have arisen when special specifications had to be similarly met.

He stated that the offices of the Steel Products Company are an encyclopedia for all iron and steel manufacturers; that his company never hesitated to give to competitors all the information available concerning special conditions in different countries, as to shipping, credits, tariffs, or other matters generally; that his company made it a point to help competitors freely.

Many products are sold at a higher price abroad than they are in this country, said Mr. Farrell. A list of such products was introduced as evidence, and he said that a much longer list could be made up. Flat specialty wire, concrete reinforcement wire, steel fence posts, flat wire springs, tramway springs, and various standard wire fencings, such as the Elwood, were on this list.

He stated most emphatically that the corporation had not entered into any pools or agreements with any foreign manufacturers, either as to prices or location of activities, nor had it made any such agreements or pools with domestic manufacturers.

### What the Export Agencies Handle

Taking a list of the Steel Product Company's agencies, the counsel for the defense questioned Mr. Farrell about the character of the export business conducted by the various branches.

"We have warehouses in such places as Antwerp," said Mr. Farrell, "Johannesburg, Sidney, Barcelona, Copenhagen, Singapore, Valparaiso, Rio Janeiro, and we carry stocks of nearly all the products we manufacture in these warehouses, with the exception of rails for steam railroads. We have a large office in London, in which there are some 35 men. London is the great clearing house for the world's products and buyers gather there. For use in England, we sell only such things as rail bonds and woven wire fence, products which are distinctly American. We sell in Scotland woven wire fencing, since that is not made there. In Glasgow we sell steel rails. In Manchester we put in the lowest bid for steel rails for the local tramway company, but the union made such a clamor that the city officials would not allow our bid to stand.

"We sell South America and other tropical countries a great deal of corrugated galvanized iron. This is used for houses, since ants and other insects attack wood. In Brazil there are large hydroelectric plants which we supply with materials such as transmission poles and equipment. We have our own erecting forces in Brazil, and in other countries at times, except in Canada, where our workmen are not permitted to work. To Uruguay we sell railroad materials, wire products and sheets. We ship direct by line vessels. There were 158 steamers leaving here for the River Plate last year. We have built every steel structure in Buenos Ayres, because our material is lighter and not so cumbersome as the European. They have attempted to sell by quoting a low price on heavy goods, while we have made a lighter but strong material to sell at a higher price. Our material was exclusively used in the Buenos Ayres Exposition.

"In Paris we sell principally to French buyers whose interests are elsewhere and to foreign countries whose home offices are in Paris. To German Southwest Africa we sell little because of competition from the mother country. We trade occasionally steel for palm oil, used in treating steel plates. Our trade with Japan amounts to $6,000,000 a year. We sell wire nails, light gauge sheets light steel rails, and ship via Suez. We are obliged at times to charter ships to send our material to Japan, as we sometimes have orders for several thousand tons at a time and the regular ships can only take about 3000 tons apiece. To Newfoundland we ship considerable railroad material. The tariff there is favorable to this country. We have an order now for 6000 tons of rails to ship there. Norway uses high carbon wire for baling, also sheet steel

and pipe. We ship to the Philippines sheets, tin plates, pipe and bars. Our largest customer is the insular government. Porto Rico takes about $2,000,000 worth of our products. We send there sheets, wire, rods, bars and rails. Our Cuban trade amounts to $5,000,000 annually. It consists of sheets, material for sugar mills, water works, and street railroads. China uses about $4,000,000 annually of our products, especially bridges. The Chinese take large quantities of defective materials, such as sheets and bars. They make a good razor out of high carbon wire rod.

"We have secured orders for 44,000 tons of rails for the Australian transcontinental railroad. We used to do considerable highway work for this country, but later the authorities took our specifications and what data they could obtain from us and had the work fabricated in England. At the invitation of the authorities we are submitting bids on a bridge to cross the Parametta River which will cost from $11,000,000 to $12,000,000.

"We sell little of our product for use in Germany, Austria, Italy and Russia because of prohibitive tariffs, and to Belgium and England we sell usually only such articles as are not manufactured at home."

## Tuesday's Hearing

The examination of Mr. Farrell was resumed Tuesday morning and a wide range of subjects was covered in bringing out the Steel Corporation's activities in various lines, its contribution to the country's progress, and the good use made of its great resources It was shown first that from 1904 to 1912 the average price received on its exports advanced about 25 per cent., while with an increase of 87½ per cent. in output, prices on products sold in this country increased 11.6 per cent. in the same time. The Steel Corporation got an average of about $4 a ton less on product disposed of in the domestic market in 1912 than in 1904. The decrease while not regular has been constant and in articles of general consumption.

Mr. Farrell said that about 10 per cent. of the Bessemer plant of the Steel Corporation had become obsolete. He predicted that for certain uses steel made by the electric process will eventually replace other steels, including open hearth, as open-hearth steel is now displacing Bessemer steel.

### The Cotton Tie Supply in 1913

The service of the Steel Corporation in supplying the country with cotton ties was alluded to, in view of the fact that other products of hoop mills have been bringing higher prices than cotton ties. Last year the production of cotton ties by the Steel Corporation was 1,925,000 bundles at 85 cents a bundle. The Steel Corporation's competitors have shown little desire this year to meet the demand for cotton ties, in view of the greater profit they were getting in other business, and if the Steel Corporation had not been willing to meet this demand and in position to take care of it, in view of the diversification of its production, the cotton crop of the country, worth about $750,000,000, might remain on the ground for lack of steel to bale it.

### New Uses of Steel Developed

Examples were given of the development of new products by the Steel Corporation, among them steel car wheels. Such wheels, it was stated, are gradually taking the place of chilled cast-iron wheels, though the latter are still in about the ratio of 16 to 1 to steel wheels. Sheet piling is coming into more general use all the time, particularly for emergencies. Recently army officers ordered 500 tons to save a levee at New Orleans. It was put through in remarkably short time, the piling reaching New Orleans in 86 hours after the order had been put on the books. The facilities for meeting this emergency undoubtedly saved New Orleans from inundation. The corporation always gives Government orders the preference. Steel for concrete reinforcement was mentioned as another product which the Steel Corporation has developed in a marked way.

### Competition of Cheap Foreign Iron and Steel

The increase of the export steel trade, it was explained, was handicapped by the cheaper labor of Europe, which is paid 37 to 38 per cent. of the wages received by similar labor in this country. Freights are often against American shipments. The German mills, for example, are able, because of special export rates, to ship to Continental ports as cheaply as they can reach interior points in Germany. While the Steel Corporation pays just the same shipping charges on exports as its competitors, the ocean carriers receive less from these competing companies, since the Steel Corporation ships directly while other companies ship through brokers who take a commission from the vessel owners.

The question of costs of production in foreign countries came up, and India and China were mentioned. Mr. Farrell spoke of the new steel plant at Sakchi in Bengal, where the Tata Iron & Steel Company produces pig iron for $5.47 a ton, with a freight of 48 cents a ton to Calcutta. Blast furnace labor there is paid at the rate of three cents a day. The freight form Calcutta to San Francisco is $5 to $6.50 a ton in sailing vessels, making the total cost delivered at San Francisco not much more than the freight on pig iron from Birmingham, Ala., to San Francisco, which is $10.08 a ton. The current price for pig iron on the Pacific Coast is $21.50. The present duty is $2.50 a ton and the proposed duty 8 per cent. A cargo of this iron from India is now on the Pacific bound for San Francisco. In China at Hankow are the Hanyang Iron Works, consisting of blast furnaces and steel plant. Here blast furnace labor is paid 16 cents a day and the total cost of pig iron is $6.20 a ton. Freights to the Pacific coast figure out $3.60 to $3.70 a ton, making the total cost of this iron delivered in the United States about $9.80 a ton. The plant at Hankow is now operating, however, to its capacity on domestic business, particularly rails for Chinese railroads.

About 200,000 tons of pig iron has been exported to the Pacific Coast from China within about four years, but the revolution there stopped shipments. Canada has shipped some iron to this country, but cannot now supply her own demand. Great Britain and Continental countries have sent pig iron here and every year there are considerable importations. Australia is building a steel plant and steel can be made there at a lower cost than in the United States.

### A Check on High Pig Tin Prices

The question of pig tin importations was brought up. The American Sheet & Tin Plate Company, it was stated, imports all its pig tin from the Straits Settlements. Welsh makers of tin plate also get most of their tin from the same source, though there are some deposits in Wales. The Steel Corporation has protected other American consumers of tin from excessive prices due to speculation in pig tin by foreign interests. Speculators have attempted at times to corner the market, and the corporation out of its large supply has sold pig tin to its competitors and to merchants at ½ of 1 per cent. advance over import cost, this small charge being made to cover foreign exchange.

### Large Wage Advances

Wages of employees in the corporation's plants have advanced 28½ per cent. since it was organized and about $40,000,000 more was paid in wages in 1911 than in 1902. The wage increase which went into effect February 1 will make the average wage per employee in 1913 about $912. The following statement was submitted showing number of men employed, total wages and average wage in the years 1902 to 1912 inclusive:

| Year | Number employees | Total wages | Average wage per employee |
|---|---|---|---|
| 1902 | 168,127 | $120,528,343 | $716.88 |
| 1903 | 167,709 | 120,763,896 | 720.08 |
| 1904 | 147,343 | 99,778,276 | 677.18 |
| 1905 | 180,158 | 128,052,955 | 710.78 |
| 1906 | 202,457 | 147,765,540 | 729.86 |
| 1907 | 210,180 | 160,825,822 | 765.18 |
| 1908 | 165,211 | 120,510,829 | 729.44 |
| 1909 | 195,500 | 151,663,394 | 775.77 |
| 1910 | 218,435 | 174,955,139 | 800.95 |
| 1911 | 196,888 | 161,419,031 | 819.85 |
| 1912 | 221,025 | 189,351,602 | 856.70 |

The Pipe & Contractors Supply Company, 3 Dover street, New York City, has opened a new shop and warehouse at 343 East 123d street. The shop is equipped to cut and thread pipe up to a maximum diameter of 12 in., and a large assortment of miscellaneous equipment for contractors' use will be carried. It is stated by the company that the large demand made by contractors in the upper part of the city necessitated the opening of this shop, and it is expected that deliveries in that part of the city will be facilitated as a result.

## Book Reviews

**Handbook of English for Engineers.** By Wilbur Owen Sypherd, professor of English in Delaware College, Newark, Del. Pages 314, 4½ x 6¾ in. Published by Scott, Foresman & Co., Chicago. Price $1.50.

In the minds of those whose duty brings them in daily or frequent contact with technical or semi-technical writings, there can be no doubt of the value of this work by Professor Sypherd. It is intended primarily, the author states, to meet the needs of advanced engineering students and of young engineers in practice, but should have a wider use. The deficiencies of many who write on technical matters, in reports, in articles for publication, in specifications and even in letters, are sometimes astonishing, and statements of the author himself and corroboration of numerous authors whom he quotes bears evidence to this fact.

The value of conciseness, clearness and good style in writing is emphasized. Rules and methods of procedure followed more or less unconsciously by successful writers are laid down. Specimen business letters, reports and long and short articles form a large part of the book, and in this respect it appears to recognize the existence of a class of ill-equipped people who are always looking for something which can be adapted with little change to their own immediate needs. In other words, the book seems to attempt in part to offer first aid to the distressed, a service obviously difficult in the field of writing.

On account of the economic importance commonly inherent in engineering writing, ideas must not be obscured by verbosity or improper verbiage, as the author points out, nor must the message suffer from bad paragraphing or faulty spelling and punctuation. Those who would profit to the utmost should apply themselves not only to reading, but to working out the examples given for practice.

The five chapters of the book are devoted to "The General Problems of Engineering Writing," "Mechanical Details Common to the Various Forms of Technical Writing," "Business Letters," "Reports" and "Articles for Technical Journals." An appendix treats of the preparation of manuscript and correction of proof. Another gives examples of faulty paragraphs and faulty sentences and lists of words frequently misused or misspelled. In his preface Professor Sypherd refers to a plan which has produced good results in Delaware College and which might well be followed by other educational institutions—the giving of a special course in composition which is definitely connected with engineering.

**Cost Reports for Executives.**—By Benjamin A. Franklin. Pages, 145, 8⅝ x 5¾ in.; 26 forms. Published by the Engineering Magazine Company, New York City. Price $5.

Here is a book with a definite purpose, built on a sound foundation, with work well laid out and logically arranged, withal surprisingly interesting and easy both to read and digest. The author has realized the little interest shown in complicated cost accounts by the average business man. Therefore he takes the business man's point of view, and having laid down his introductory chapter beginning "An essential aim and vital incentive of all manufacturers is profit," he quickly ties up ordinary bookkeeping records, which every business man understands, to an order cost record.

This record is really a cost sheet of the most practical kind, showing material, labor, expense, total cost, selling price and profit on different order numbers. In fact, one would almost wish the author had proceeded conventionally, postponed this climax, led up to it by easy but devious stages, but here it is on the back of the second sheet of forms, with, for comparison, similarly itemized "standard figures"—standard as proved by ordinary practice in the shop. It seems that he should have more emphatically labeled the import of the order cost record. He tells lucidly how it is to be made up—by tearing apart totals and with the quotients building up the easily proved cost of manufacture, instead of attempting to assemble this result from details, the usual way. Yet the result is so easily and quickly accomplished that its import is apt to be lost without more stress upon the result itself.

In the book are no forms for form's sake; no details involving circumstances which might not be met by any of its readers, and which might greatly confuse. Instead, there are principles given and forms that can most easily be varied to suit special requirements. The various cost forms needed are given, each one simple and full of practical meaning; for example, various analyses of expense accounts and an analysis of "labor and machine operations."

The author brings out strongly that the stability of manufacturing trades depends to a not unimportant extent upon the realization of real costs by all in the trade, and that there would be fewer instances of undercutting and few demoralized markets if actual total costs were more widely known. To meet the difficulty associations of manufacturers, for example, the National Association of Machine Tool Builders, have adopted a uniform cost system.

Following the analysis of strictly cost data, the writer gives a chapter on "Statistics as an Aid," statistics easily obtainable in connection with cost records; for example, an analysis of the salesman's records and profits.

The author clearly realizes the difficulty arising in cost keeping, difficulty of having a complete cost system installed sufficiently adequate and definite to be useful, the delays incidental and the patience required in its accomplishment. The book is suggestive rather than exhaustive, sticks to its purpose and closely holds to the viewpoint of the executive. It cleverly shows him the necessity, the means and results of a carefully worked out system of costs and shows how intelligently to use the results obtained.

**Steel: Its Selection, Annealing, Hardening and Tempering.** By E. R. Markham. Fourth Edition, cloth. Pages, 367, 5½ x 7⅝ in. Published by the Norman W. Henley Publishing Company, New York. Price $2.50.

The development of the automobile, the gas engine and the aeroplane has created a demand for special steels specially treated. In consequence of the gradual fulfilment of this demand a revision of this work was necessary. Nearly every method of heat treatment as applied to all kinds of tools is fully described and discussed, the information being based on the author's practical experience of 25 years. It is claimed to be a standard work on the subject and a practical book for the machinist, tool maker, blacksmith, tool hardener and superintendent. There are many practical workmen who need just such a guide. The book is fully illustrated.

**Automatische Registrierwagen** (Automatic Registering Scales). By O. Tauchnitz. Cloth. Pages, vi + 124, 6¾ x 9⅝ in. Published by R. Oldenbourg, Münich and Berlin.

The object of the author of this book is to bring together a complete description of every kind of scales which automatically register their loads, etc., and to fill a gap in the literature of the subject. All varieties of scales for weighing grain of all kinds, cement, oil, sugar, etc., are described mathematically and in detail, extensive plates and cuts accompanying each. The book should be of interest to the engineer as well as the general reader.

**The Electrical Blue Book.**—The 1912 Electrical Blue Book, edited and published by the Electrical Review Publishing Company, Chicago, Ill., contains 206 pages, which have been divided into three sections. Section 1 is a comprehensive exhibit of officially approved electrical supplies, and section 2 is an illustrated list of other representative lines of electrical material that users of this book would have occasion to purchase. The last section makes the book of especial value to users of electrical material, its feature being the National Electrical Code, which comprises the rules and regulations of the National Board of Fire Underwriters for electrical wiring and apparatus as recommended by the National Fire Protective Association. The rules are explained in detail with accompanying illustrations, which further enable the reader to reach a complete understanding of their correct interpretation. The book is sold for $2.

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John Birkinbine is president of the Pennsylvania Forestry Association, which will hold a forestry exhibition in Horticultural Hall, Philadelphia, May 20 to 24.

## Customs Decisions

### Sheet Metal Drums as Containers

The Board of United States General Appraisers has taken favorable action on protests by A. C. Horn & Co., New York, dealing with the classification of sheet metal drums used as containers of a coal tar preparation. The collector assessed the articles as unusual coverings under paragraph 151 at the rate of 30 per cent. The importers insisted that the coverings were usual, and that duty should have been taken at the same rate as the contents under sub-section 18 of section 28. In finding for the protestants, Judge Fischer says that the board is convinced that the containers are rendered valueless upon the removal of their contents and are neither fit nor intended for continued use in commerce as containers. Protests by the Monsanto Chemical Works and the Texas & Pacific Railroad Company, objecting to assessment on cylindrical metal coverings for chemicals were overruled, as the board decided they had been properly taxed as unusual containers.

### Sharpeners for Meat Slicers

The board overruled a contention raised by Gallagher & Ascher, Chicago, relating to the classification of sharpeners for meat slicers. The sharpeners are attached to the slicing machines and are composed of steel parts and emery wheels. The wheels when affixed to the meat slicers are revolved and driven by the friction of the knives of the machine. Duty was assessed on the sharpeners at 45 per cent. under paragraph 199, as "manufactures of metal." The importers asserted that the sharpeners should be regarded as "machine tools," with duty under paragraph 197, at 30 per cent. The board's decision says that the articles in controversy are parts of machines, rather than machine tools. The proof showed that they are used only on meat slicing machines and that they are in no sense power tools. The assessment was affirmed.

### Nickel Plated Steel Strips

The United States Court of Customs Appeals has taken adverse action in a protest filed by Hirsch & Co. against the classification imposed by the custom house authorities on importations of nickel-plated steel strips put up in coils. The merchandise was returned by the appraiser as "manufactures of metal not specially provided for," and duty collected at the rate of 45 per cent The importers protested, claiming the goods to be dutiable at 35 per cent. as strips of steel exceeding 12 ft. in length not specially provided for, under paragraph 124, or at that rate plus 2/10 of 1 ct. per lb., because coated with nickel, as provided in paragraph 128.

The testimony disclosed that the metal comes in long coils; that steel constitutes the body of the articles; that the steel body is subjected to a galvanizing process, whereby it is first treated with copper and then entirely plated with nickel. It was shown that the steel body composes the greater bulk of the finished article, although apparently the nickel has relatively the greater value. The metal is used chiefly in the manufacture of novelties, buttons, buckles and watch cases. The court holds that the classification imposed was the applicable one because when the steel strips were plated with nickel they became something more than steel strips, and, not being specifically enumerated in their advanced condition, they properly fall within the general provisions of paragraph 199.

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The monthly meeting of the Boston Branch, National Metal Trades Association, at Young's Hotel, Boston, May 7, was given up to a discussion of flat turret lathes, at which the speakers were W. R. Warner, Warner & Swasey Company, Cleveland, Ohio, and James Hartness, Jones & Lamson Machine Company, Springfield, Vt. The talks were illustrated by stereopticon slides. President Martin T. McLauthlin was in the chair.

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The Hoyt-Noe Steel Company, Monroe and Jefferson streets, Chicago, incorporated to succeed T. W. Hoyt, has been appointed Western agent for Hobson, Houghton & Co., Sheffield, England, and will carry a $20,000 stock of tool steel.

## Power Transmission Efficiency

### The Part of the Growing Industrial Plant Now Getting Attention

BY CHESTER REESE, M.E.*

One of the greatest advances which has been made of late in the development of mechanical engineering is the appreciation of the interdependence of one portion of an undertaking with every other. Formerly it was not unusual to find the designer satisfied if he had produced a steam engine which was highly economical in its steam consumption, even though its cost for repairs and its burden for interest and depreciation might be excessive. Each portion of a plant was considered by itself, and responsibility ceased at one point only to begin at another.

This was especially true as regards the manufacture and use of power. The boiler was regarded as one unit, for the purpose of generating steam; the engine as another, an apparatus for transforming the expansive force of the steam into the revolutions of the main shaft. From the main shaft all idea of coherence seemed to have been abandoned, and the power was taken off in many directions as the exigencies of the growing plant demanded, using countershafts, pulleys, gears, clutches, etc., as circumstances seemed to indicate. If all worked well, so much the better; if not the job was tinkered until the trouble was overcome. Any idea as to the efficiency of the power plant as a whole was rarely considered; and, indeed, it was hardly practicable to get at any definite facts upon which performance could be determined.

### Present Attitude Toward Power Production Efficiency

At the present time a wholly different method is followed. The entire power plant is properly treated as a whole and its efficiency considered as if it were a unit, consisting of a machine into which fuel is fed and out of which comes power at the point of application. Under such a comprehensive view a power system may be considered as composed of three principal elements; the boiler, in which the steam is generated; the engine, in which the steam is employed, and the transmission, by which the power is delivered to the points of application. The efficiency of the whole is the continued product of the efficiencies of these elements, and only by keeping each of them up to the maximum can the real value of all be secured.

It is only recently that the third of these elements—the transmission—has received the consideration which it deserves. If its efficiency is to be as high as it can properly be made, it must be considered as a whole, and planned and constructed for the particular place in which it is to be employed and for the special kind of service to be performed. If, in addition to such definite design, a transmission system, including shafting, pulleys, hangers, bearing, clutches and all details, is assembled and given a critical running test by the maker, it becomes practicable to determine positively just what may be expected of it in actual service. When handled in such a manner the transmission portion of a power plant becomes a machine in itself, and its possible efficiency may be determined in a manner similar to that of the other elements of the system—the boiler and the engine.

### Transmission Apparatus Now the Focus of Study

It is an interesting fact to note that almost invariably any attempt to increase the productive capacity of a manufacturing plant by the introduction of modern efficiency methods is met by transmission difficulties, showing that the existing equipment has been practically a growth to serve older conditions and is incapable of meeting any greater demands until it has been overhauled and improved.

Many years ago the late Robert Briggs maintained that practically all belts were run as slack as they could be, simply because little or no attention was given to them so long as they pulled the machines. In many instances such conditions are true of other things besides belt tensions, and if this state of affairs is to be superseded it must be by the application of true engineering principles to the transmission portion of the plant.

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*Dodge Mfg. Company, Mishawaka, Ind.

# The Machinery Markets

Because of the tendency toward conservatism in many sections of the country, buying has decreased, which may be traced in part to impending tariff legislation, but a fair amount of miscellaneous business is reported at several points and actual improvement in two cities. New York, with current business of a scattered character, is quiet with railroad business still in prospect. The Pennsylvania Railroad has placed a few orders in Philadelphia, but business is confined generally to odd lots and the situation is quiet. Machine tool builders continue busy and skilled labor is scarce in New England, where opinions differ as to the outcome of probable tariff changes. Single tool orders have been of sufficient volume to cause an improvement in Cleveland. In Cincinnati the machinery business is slow, although helped along by railroad buying of tools for replacement. The export trade is dull. Detroit conditions have undergone little change, although there is a better demand for woodworking tools and electrical equipment. Conditions in the Central South have improved considerably. In Milwaukee both orders and inquiries are mostly for single tools, but business is considered satisfactory. Conservatism is apparent in St. Louis, but the market is considered reasonably satisfactory. Activity has fallen off in Birmingham, but it is better than it was at this season a year ago, with a notable demand for steam and gasoline engines and pumps. Steadily improving crop conditions in Texas are affecting business favorably and there is unusual activity in electrical development in the Southwestern part of the country. There are no noteworthy features in the machinery trade on the Pacific coast, where business is almost entirely of a routine character, but fairly good in volume.

## New York

NEW YORK, May 14, 1913.

To the several lists of railroad requirements before the New York trade has been added a new one issued by the Delaware, Lackawanna & Western Railroad which specifies 19 machine tools. Prospective railroad business, to which reference has been made heretofore, continues to be a steadying feature of the local market and early action in some of these is hoped for. Current business is quiet with most of the trade, and scattered and miscellaneous buying of less than fair volume is about all that is doing. Reports from the western part of New York State indicate a still smaller volume of buying. To a slowing up attributed to impending tariff legislation is added the depressing influence of a number of strikes, involving machinists, molders and other classes of labor. The machines required by the Delaware, Lackawanna & Western are for delivery to its shops at Kingsland, N. J., and Scranton, Pa. It is requested that bids be submitted for belt drive and for electric drive and in the case of the latter, prices are wanted with two provisos, first, that motors be furnished with the machine, and second, that the railroad supply them. The list follows:

**Delaware, Lackawanna & Western List**

One 16-in. stroke back-geared crank shaper.

One Bridgeport or equivalent No. 6 safety emery wheel grinder.

One 18-in. stroke heavy duty slotter, Dill or equivalent to slot to center of 72-in. diameter.

One 24-in. Gould & Eberhardt high duty extension base shaper, belt driven through single friction clutch pulley.

Two Gould & Eberhardt high duty extension base shapers.

One 2¼ x 24-in. Warner & Swasey No. 2 A belt driven hollow hexagon turret lathe.

One 2¼ x 24-in. No. 2 A belt driven hollow hexagon turret lathe.

One 16-in. x 6-ft. American or equivalent, high speed, geared head lathe.

One 18-in. x 6-ft. bed American or equivalent, high speed, geared head lathe.

One 16-in. x 14-ft. American or equivalent, high speed, geared head lathe.

Two 18-in. x 10-ft. bed American or equivalent, engine lathes.

One 72-in. heavy duty plain radial drill.

One No. 2 Newton or equivalent combination cold saw and cutting off machine.

One 16-in. x 8-ft. American or equivalent, high speed, geared head engine lathe.

One 12-in. x 6-ft. American or equivalent, geared head engine lathe.

One single-spindle horizontal drilling machine for drilling pipe flanges.

One 18-in. monitor turret lathe, Bardons or Oliver or equivalent.

The Bierman-Everett Foundry Company, Irvington, N. J., recently incorporated to manufacture welding supplies, small gray iron and malleable iron castings, has about completed its plant at Irvington, adjoining the Lehigh Valley Railroad. The company has purchased a large part of its equipment which consists of a Taxson-Colliau cupola, tumbling room equipment, Arcade squeezers for molding and other machines necessary for a foundry. The officers are George Bierman, president; William H. Mantz, vice-president and treasurer, and John E. Berlenbach, secretary.

The A. L. Swett Iron Works, Medina, N. Y., has commenced work on an extensive addition to its plant on Glenwood avenue. The cost, including equipment, will be about $30,000.

The Westerhoff Bros. & Napier Company, silk manufacturer, Paterson, N. J., has secured an option on land at Batavia, N. Y., suitable for the building of a large silk plant and it is stated will erect a factory to cost $65,000.

A new factory building is being erected by Frederick Hart, Poughkeepsie, N. Y., manufacturer of special machinery and appliances. The estimated cost is $25,000.

The car and locomotive repair shops of the West Shore Railroad at Kingston, N. Y., which were recently destroyed by fire are to be rebuilt at once upon a scale which will practically double the capacity of the former plant.

A four-story factory building to cost $80,000 is to be erected at Arch street and Trinity place, Albany, by the American Tobacco Company, New York City. The general contract has been awarded to the W. S. Hamil Company of Troy.

The Thorn Hold-Fast Company, Troy, N. Y., is building a new factory 70 x 132 ft., three stories, brick, on Front street to replace the plant recently destroyed by fire.

The Afton-Windsor Light, Heat & Power Company, Afton, N. Y., has been incorporated and will construct a generating plant. C. Fred. Wright, Susquehanna, Pa., and W. E. Bennett, Lanesboro, Pa., are among the directors.

The Rome Wire Works, Rome, N. Y., is adding to its plant a one-story building 135 x 200 ft., of concrete.

A new boiler house 30 x 32 ft. is being erected by the Frisbie & Stanfield Knitting Company at Camden, N. Y. A 150-hp. boiler will be installed.

The Standard Oil Company will build a three-story factory addition at its Peekskill, N. Y., plant. The estimated cost is $30,000.

The milling plant and storehouse of the Elmore Milling Company, Oneonta, N. Y., was destroyed by fire May 7, entailing damage estimated at $200,000. It is the intention of the company to rebuild at once.

The Specialty Insulation Mfg. Company, Inc., Hoosick Falls, N. Y., has been incorporated with a capital stock of $30,000 to manufacture electric insulation, etc. It will erect a plant. C. Batcholts, Hoosick Falls, and M. Casey and W. P. Wood, Pittsfield, Mass., are the incorporators.

The E. & B. Holmes Machine Company, Buffalo, will build a two-story machine shop 45 x 116 ft. at Ohio and Chicago streets. Architects Lansing, Bley & Lyman, Prudential Building, are receiving bids.

The Atlas Steel Casting Company, Buffalo, N. Y., is planning to double the capacity of its steel foundry floor and making additions to the cleaning department.

The New York Car Wheel Company at Buffalo, N. Y., Mitchel McDougal, president, is about to offer for sale the plant equipment of the Bogart Gas Engineering Company of that city.

The Acme Steel & Malleable Iron Works, Buffalo, has just completed a new core oven room 100 x 144 ft. and has constructed several new ovens of their own design.

The Crosby Company, 182 Pratt street, Buffalo, N. Y., manufacturer of sheet metal stampings, is completing a new factory building adjoining its present site which will increase the production about 25 per cent. and be in operation within the next 30 days.

The plant of the Lumen Bearing Company, Buffalo, was damaged by fire May 12 to the extent of $25,000. The portion damaged contained considerable expensive machinery.

### Catalogues Wanted

The Raymond Accessories Company, Department A, 420 Ashland avenue, Buffalo, N. Y., desires circulars on the following machines: Combined drilling and tapping press, large and small rolls for boiler work, punch and shear, air compressors, bolt machines, beveling machines, flanging clamps, steam hammers and steam engines.

The United States Hoffman Company, Syracuse, N. Y., is desirous of receiving catalogues covering light machinery and tools.

## New England

BOSTON, MASS., May 13, 1913.

Opinions of the business situation are as variegated as the leaves of autumn. It is characteristic of the situation that theory has to be the all-important element in forming judgment. To-day business is very good and has slackened but little in metal lines, taking the average. Crop reports are favorable with winter wheat promising a most satisfactory outcome. The depressing influence of pending legislation is probably greater than if the tariff bill had become a law over night, for some lines of industry are perhaps compelled to magnify possible results of the schedule as framed by the House. Certain branches of the textile business will be injured and there are various other anomalous features in the bill. Hardware merchants report that already European manufacturers are showing a tendency to advance their prices because of the probable reduction in our tariff, from which fact much can be argued.

The machinery and supply dealers report business unchanged. No hint of cancellations has been dropped and the volume of deferred orders is not great. The machine tool builders are doing a very good business, in some cases not up to full capacity, but fully up to normal.

In the wire industry some lines have fallen off, but on the other hand the demand for various products has increased as shown in new bookings.

The Boston & Maine repair shops in Charlestown were badly damaged as the result of a fire which swept a considerable area on the Mystic River on Sunday.

The Board of Trade of Malden, Mass., proposes to erect an industrial building for metal, 50 x 300 ft., three stories.

A movement is on foot to establish the Chamber of Commerce of Southern New England, which will be made up of various associations now in existence, working together to accomplish civic and industrial benefits. It will include the territory containing the Providence group of cities, including Attleboro, Mass.; Pawtucket, Central Falls and Woonsocket, R. I.; New Bedford, Fall River and Taunton. One purpose is to establish a universal labor bureau and bureaus of industrial education and legislation. The city of Providence and its suburbs is already served by the Labor Bureau of the Rhode Island Branch, National Metal Trades Association. The new movement would go far beyond this, however, embracing in its scope all manufacturing industries.

Skilled labor is just as scarce as it has been. If there is any slowing up in the metal industries the market for labor does not show it. The various labor bureaus have been making almost desperate efforts to get for their clients large numbers of men, but without success. A two weeks' tour by an agent through New England cities netted but one or two men for the people he represented. In Worcester alone several hundred high-class men could be placed instantly, and similar reports come from other cities where machine shops are operated on a large scale.

The state of Connecticut is legislating a bill providing for a bridge across the Housatonic River at Stratford, to cost $400,000, and the state of Massachusetts for a bridge at Lake Quinsigamond, Worcester, to cost $200,000.

The Traut & Hine Mfg. Company, New Britain, Conn., manufacturer of hardware specialties, will extend its plating department to increase the capacity one-third.

The Connecticut Transit Company has been formed with authorized capital stock of $300,000, to operate a steamboat line between Hartford and New London, serving the Connecticut River towns, as well as the important industrial cities which will be the terminals. Edward H. Warner, Hartford, is the president; Daniel M. Wright, Hartford, vice-president; P. Le Roy Harwood, New London, treasurer, and F. K. Whitman, Hartford, secretary, the directors consisting of the president, vice-president and treasurer, and A. C. Kretsmen, Middletown, Conn.; W. H. Cadwell, New Britain, and W. H. Heald, Wilmington, Del. The transportation question in New England is one of vital importance and constant effort is being made to get rid of the disadvantages of consolidated interests, which have largely eliminated competition. The new company will begin business by operating one steamer of moderate size carrying both passengers and freight.

The Noble & Westbrook Mfg. Company, Hartford, Conn., has been incorporated to take over the business of Noble & Westbrook, manufacturer of metal marking machines and their products. The company is erecting a factory at East Hartford and will maintain its sales department at the present location, 9 Asylum street. The incorporators are George Westbrook, Richard H. Noble and Daniel D. Bidwell. The company recently acquired the rights and patterns of the Dwight Slate metal marking machine.

The Putnam Foundry & Machine Company, Putnam, Conn., manufacturer of heating appliances, has increased its capital stock from $75,000 to $200,000, the purpose being to take care of the increasing business. However, no addition to the present buildings will be undertaken this season.

The American Chain Company and the Weed Chain Tire Grip Company will require no new equipment for the two factories which are in process of construction at Bridgeport, Conn. Existing equipment is being assembled at the new factories, from the plants at Cleveland, Ohio, Sherrill, N. Y., New York City and smaller plants already located at Bridgeport.

The business of the Union Pin Company, Winsted, Conn., has been incorporated under a Connecticut charter, with paid-in capital of $21,000. The incorporators are James Kelley, Winsted, and Thomas Murray and Peter H. Allison, Torrington, Conn. The company has been manufacturing pins for a year and has its machine tool equipment with which it builds its own special machinery.

The Norton Grinding Company, Worcester, Mass., has completed for the National Tube Company's factory at Lorain, Ohio, a roll grinding machine for rolls up to 40 in. in diameter. The machine weighs 50 tons and is probably the largest of its class ever constructed. The company is giving a demonstration of the machine Wednesday afternoon of this week.

## Philadelphia

PHILADELPHIA, PA., May 12, 1913.

Quiet conditions continue in the local machinery market. Prospective buyers are in no haste to close pending negotiations. Without doubt, the pending tariff revision has caused some uncertainty and lack of confidence, which is being felt in the machinery as well as other trades. The week's business was confined largely to odd lot transactions. Several merchants have received orders for a few tools from the Pennsylvania Railroad, applying, however, against inquiries received prior to the recent general inquiry. Orders were also divided among a number of sellers for equipment for the Frankford Arsenal. In some lines April business has been reported as comparatively good, but May, up to date, has not been very encouraging. The second-hand machinery market continues dull. More business is pending and in sight for moderate power equipment, but contracts develop slowly. The foundry trade is fairly active but some foundries have been harassed with labor troubles. So far, makers of castings for the general machine tool trade have not been affected.

H. B. Underwood & Co., a copartnership operating the L. B. Flanders Machine Works, made application May 5 for a Pennsylvania charter. The corporation will be known as H. B. Underwood & Co., Inc. David C. Hitchner, H. D. Griffith and C. O. Ralph, who, together with Morris G. Condon, composed the partnership, were named as the incorporators.

The Philadelphia & Reading Railway has let the contract for its repair shops at St. Clair, Pa., to Irwin & Leighton. Plans call for buildings of skeleton steel structure, which will be furnished by the Phoenix Bridge Company. The building will be equipped with a blower heating system, also several electric traveling cranes.

The McHatton Foundry Company has been incorporated under the Pennsylvania laws, with a capital stock of $50,000, and succeeds the McHatton Smelting Company, Fifteenth street and Washington avenue. Worall W. Wagner is president, J. C. Wright is secretary and B. H. Davis is treasurer of the new corporation. Plans are under way for increasing the melting capacity of the plant and other facilities conducive to a larger output will be considered.

The Allerway-Martin Company, manufacturer of automobile bodies, is having plans prepared by E. Allen Wilson for a four-story manufacturing plant to be erected at Thirty-seventh and Filbert streets.

Crook, Kries & Co., heating and ventilating engineers, Baltimore, Md., have purchased the building, machinery and good will of the Thomas C. Basshor Company, on Light street, in that city, and will consolidate it with their present plant. Plans are under way for enlarging their facilities so as to take on new lines of business.

Estimates are being taken by the General Engineering Company, Front and Kenilworth streets, for the construction of a 70 x 150 ft. addition, to be used as a machine shop. Particulars regarding proposed equipment are not available.

Local builders are estimating on plans by W. Hunter, architect, for a boiler and pump house 33 x 65 ft., to be erected at Yardley, Pa., for the Philadelphia & Reading Railway.

Plans have been prepared by Edgar Zeillion, Baltimore, Md., for a six-story warehouse, 84 ft. 6 in. x 120 ft., to be erected at 410-12-14 South Hanover street, for Edward L. Ward, to be occupied under long lease by the Haywood Bros. & Wakefield Company, chair manufacturer.

## Chicago

CHICAGO, ILL., May 13, 1913.

The demand for second-hand machinery in this market has been well cared for in the past fortnight by the disposal at attractive prices of a large and varied stock which has been accumulated here. From this standpoint machinery sales have been very good. New machines have found purchasers with less frequency. The additional list issued by the Chicago & Northwestern Railway and a number of machines for which prices have been asked by another road hold out the prospect for some improvement in this respect. The Missouri, Oklahoma & Gulf Railway has let contracts for the building of a new machine shop and the Chicago & Alton has made its initial appropriation for the extensive shop improvements contemplated at Bloomington, Ill. Crawford & McCrimmon, Brazil, Ind., makers of mining equipment, are also building a machine shop of substantial proportions.

Bernard Heinig, Chicago, will build a two-story wagon shop 50 x 100 ft., on Webster near Clybourn avenue. The cost is estimated at $15,000.

The W. W. Wilcox Company, Chicago, maker of metal stampings, has prepared plans for a new factory building at Armitage and Hermitage avenues to be 125 x 145 ft. and to cost $20,000.

The Monarch Motor Mfg. Company, Chicago, has taken out a building permit providing for the erection of a one-story brick factory 50 x 175 ft., at 4634 West Madison street, the estimated cost being $16,000.

The Ford Motor Company is proceeding with the construction of its six-story factory and warehouse at Chicago. The building will be 160 x 230 ft. and will cost $400,000.

The Illinois Malleable Iron Company, Chicago, will build a foundry building, 163 x 181 ft., one story, at its Paulina street plant, the plans providing for an expenditure of $20,000.

The Johnson Welding & Auto Repairing Company, Chicago, has been incorporated with a capital stock of $2500 by N. Johnson, H. I. Hecht, 5744 Windsor avenue, and J. M. Miller.

The Automatic Devices Company, incorporated under the laws of Illinois by C. F. Hurburgh, E. M. Wharff and R. C. Wharff, has purchased the good-will, material, tools and machinery of the Robson Mfg. Company, Galesburg, Ill. The new company will begin at once the manufacture of an automatic, spring operated engine starter for use on automobiles or other gasoline engines. The device, which has been perfected after more than two years' continuous work, will be known as the Knutson starter and is the invention of A. W. Knutson, inventor of the Knutson trolley retriever. The company will also continue the Robson Mfg. Company's business in emery wheel and grindstone dressers, hose clamp tools, label feeders and other special tools, machinery and devices.

The Galesburg Malleable Castings Company, Galesburg, Ill., has found it necessary to install new pneumatic equipment and to increase the core room and annealing capacity in order to meet the requirements of its very heavy business.

The Illinois Iron & Bolt Company, Carpentersville, Ill., has had plans completed for a two-story addition to the bolt factory, to be 89 x 102 ft., and a two-story warehouse 57 x 123 ft. The new construction is to cost $50,000.

The Beall Tool Company, Alton, Ill., has been incorporated with a capital stock of $300,000 by Charles L. Beall, J. M. Malcolm and Henry S. Baker. The company will take over an existing plant and make some improvements.

The Northern Pacific Railway is about to let contracts at St. Paul for a machine shop, a 24-stall roundhouse and other facilities for which an expenditure of $175,000 is contemplated.

The Chicago & Alton Railway, whose new shops at Bloomington, Ill., have been projected for some time, has authorized an appropriation of $987,000 for this purpose and the work of erection will begin at once. A total outlay of $1,800,000 is contemplated in the next three years.

The Dumond Mfg. Company, Cedar Falls, Iowa, has been incorporated with a capital stock of $10,000 to manufacture washing machines. The officers of the company include C. M. Dumond, president, of Waterloo; B. T. Moon, secretary, and W. N. Nostrop, treasurer, both of Cedar Falls.

## Cleveland

CLEVELAND, OHIO, May 13, 1913.

The local machine tool demand has improved, a fair volume of scattered orders having come out in the week for from single tools up to lots of three or four machines. Much of this business was from small new concerns. Inquiry is also better. Among the prospective business is a new list on which are about a dozen tools. The demand is largely for small machines. The Ohio rubber tire manufacturers are very busy and some of them are adding to their machine shop equipment. Some inquiries are now pending from this source. The demand for punching and shearing machinery is more active than for some time, this business coming from railroads and allied interests. The general manufacturing situation in metal working lines continues satisfactory. Nearly all plants are running at full capacity. The demand for second-hand machinery is fairly good, this also having improved somewhat.

The Samuel Austin & Sons Company, Cleveland, has recently taken contracts for designing and the erection of two large manufacturing plants in Canada. One will be built at Medicine Hat, Alberta, for the Alberta Glass Company. There will be five buildings of brick and steel construction. This plant will involve an expenditure of about $250,000. The other plant will be built at Thorold, Ont., for Pitkinzton Brothers, St. Helens, England. This will include six large buildings for the manufacture of window glass. The buildings will be of brick and steel construction and the plant will cost about $200,000.

The Steel Improvement Company, Cleveland, recently incorporated with a capital stock of $10,000, will establish laboratories on Windsor avenue for the heat treatment of steel and the solution of various metallurgical problems. Compounds will also be made for case hardening. Those interested in the company are William C. Wythe, William H. Werry, W. B. Cleveland, A. B. Conkey, Robert R. Abbott and George F. Hammond. Offices for the present will be located in the plant of the Forest City Electric Company on Windsor avenue. The company will purchase complete laboratory equipment.

The Warren City Tank & Boiler Company, Warren, Ohio, has nearly completed a temporary plant, 125 x 300 ft., to replace its plant which was recently burned. The company has under consideration the removal to another city and expects to reach a decision regarding its permanent site within the next few days.

The Ohio Steel & Wire Company, Warren, expects to resume within the next week or two work on the erection of its new plant, which it plans to have ready for operation during the coming fall.

The city of Cleveland will receive bids through the director of public service May 20 for a shaper,

radial drill and pipe threading machine for the waterworks department. On May 20 bids will be received for a hoisting engine for the same department, and on May 21 proposals will be received for two steel side dump railroad cars for the city garbage plant. On May 27 bids will be received for boilers for the water department.

The Rauch & Lang Carriage Company, Cleveland, will enlarge its automobile plant by the erection of a four-story addition. The new building will be 112 x 199 ft. of brick and steel construction.

The Harris Carburetor Company is the name of a new concern that is establishing a plant in a block at Payne avenue and East Seventeenth street, Cleveland, for the manufacture of carbureters. The company has purchased some machinery and is expected to need additional equipment a little later. The company has been incorporated with a capital stock of $10,000 by H. C. Cummings, F. B. Frishman and others.

A. K. Bullock, 10,895 Lake avenue, Cleveland, is buying equipment for starting a machine shop for the manufacture of a specialty.

A new foundry will be established in Delphos, Ohio, by J. L. Fortener. It will be located in the washing machine factory building in that place, which was recently purchased by Mr. Fortener. R. F. Marsh will be associated with him in the business.

The Morgan & Marshall Co-Operative Tire & Rubber Company, East Liverpool, Ohio, has acquired a site for a plant and will shortly place a contract for a building 90 x 107 ft.

The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, will shortly begin the erection of large extensions to its plant, plans for which were announced some time ago.

The Cleveland Heater Company, Cleveland, Ohio, maker of instantaneous and tank gas water heaters, is having plans prepared for a new plant which will be located on West One Hundred and Twelfth street.

Bids for a horizontal compound crank and flywheel condensing pumping engine will be received by the director of public service, Urbana, Ohio, May 21.

The Grant-Lees Machine Company, Cleveland, has changed its name to the Grant-Lees Gear Company.

The Imperial Brass Foundry & Mfg. Company, Painesville, Ohio, was recently incorporated with a capital stock of $50,000 to manufacture steam, gas and water fittings. Its plant, consisting of brass foundry, machine shop, core room and several smaller departments will begin operating in a few weeks. The company is planning an extension to its foundry which will give the plant about 20,000 sq. ft. of floor space. The manufacture of aluminum kitchen ware will be undertaken in about two or three months. J. I. English is president; John Kennedy, vice-president and general manager, and M. T. Williams, secretary and treasurer.

## Cincinnati

CINCINNATI, OHIO, May 12, 1913.

The Cincinnati Building Construction Employers' Association, recently organized, is at loggerheads with the several different labor unions. It is quite probable that by the time this goes to press practically all construction work here will be at a standstill. The object of the employers is to eliminate annoying sympathetic strikes that have retarded building operations in this city for some time.

The machine tool business is slow just now, but it is reported from several sources that the railroads are buying a number of single tools for replacements. Export trade is very dull. Second-hand machinery dealers report some improvement, with a number of orders coming from the South for power equipment.

The Cincinnati Planer Company, Oakley, Cincinnati, is in the market for a 25-ton electric traveling crane with a 5-ton auxiliary.

A. C. Weiss, Cincinnati, will erect a garage and automobile repair shop at 112 West Court street, for which a few small machine tools will be required.

J. M. Wiliams, Director of Public Service, Portsmouth, Ohio, will soon ask for bids for the necessary steel to replace a 300-ft. bridge washed away by the recent floods.

A. H. Bannon, Portsmouth, Ohio, has had plans prepared for a garage and repair shop that will be 80 x 96 ft., two stories and of reinforced concrete construction. Machinery equipment will be purchased later.

The Springfield Railway Company, Springfield, Ohio, is planning a number of additions to its plant, included in which is a machine and carpenter shop.

The Egry Register Company, Dayton, Ohio, will soon be ready to install the necessary equipment in its new five-story addition. Work on this was held back by the recent floods, but the new building is expected to be completed before July 1.

The Pinneo & Daniels Company, Dayton, Ohio, is buying equipment for its new plant, now being erected in Edgemont suburb. The company will manufacture a special automobile and auto-truck wheel.

The Indiana Brass Foundry & Mfg. Company, South Bend, Ind., has been incorporated with $10,000 capital stock to manufacture brass specialties. Samuel J. Smethers is named as one of the principal incorporators.

The Bollivar Light & Power Company, Bollivar, Ohio, has been incorporated with $10,000 capital stock and will probably install a small lighting plant. H. L. Lash and J. B. Ramsey are named among the incorporators.

The Charles Boldt Company, Cincinnati, intends to erect a three-story warehouse and corrugated paper factory at Davis lane and Carter street. Nothing is yet known as to the machinery requirements.

The Warner Elevator Mfg. Company, Cincinnati, will soon erect a two-story addition that will be used for office and warehouse purposes.

The Enterprise Company, Columbiana, Ohio, has been incorporated with $100,000 capital stock to manufacture and deal in engines, boilers and general machinery. Jacob Detwiler is one of the principal incorporators.

## Detroit

DETROIT, MICH., May 13, 1913.

Business remains on the same level as reported last week and is somewhat spotty. The bulk of the sales have been in single tools, although there has been some business of larger magnitude placed by two local metal working industries. There has been a more active demand for woodworking equipment and for electrical apparatus. The automobile industry is in good shape, but manufacturers are following a conservative tendency in placing orders for additional equipment. New inquiry is largely of a miscellaneous character, but is of sufficient volume to be pleasing to merchants. There is a fair amount of business moving in the second-hand machinery market. Building circles are steadily becoming more active and a large amount of new work is being figured on by contractors.

The Chalmers Motor Car Company, Detroit, has begun the erection of another addition to its plant. The new building will be 45 & 60 ft., one story and of brick construction.

The Monarch Motor Car Company, Detroit, has filed articles of incorporation giving its capital stock at $30,000, and will engage in the manufacture of automobiles. August J. Bloom is the principal stockholder.

The Detroit Graphite Company, Detroit, paint manufacturer, has let the contract for an addition to its plant on Twelfth street, to cost $30,000. The new building will be 70 x 74 ft., five stories, and will be used partly for manufacturing and partly for warehouse purposes.

The Board of Education, Detroit, will erect a new boiler house to serve the Northwestern High School. The plans call for a one-story building 42 & 91 ft., to cost $45,000, exclusive of its equipment.

The Warner-Detroit Motor Works, Detroit, has been organized by H. L. Warner and others to manufacture gasoline motors. The company has temporary offices in the Dime Bank Building and is planning the erection of a factory. The new concern is in no way connected with the Warner Gear Works, as stated in the daily press.

William H. Marburg, 586 Gratiot avenue, Detroit, has taken out a building permit for the erection of a three-story brick factory building 48 x 80 ft. Details of equipment are not available.

The Wondras Mfg. Company, Detroit, has been incorporated with $5,000 capital stock to manufacture hardware specialties. The incorporators are Adam J. Wondras, Scott M. Atkin and Homer D. McDonald.

The Philippart Motor Car Company, Detroit, has been incorporated with $2,000 capital stock to manufacture automobile engines and accessories. Aime Philippart is the principal stockholder. Operations will be carried on at Ecorse, Detroit, suburb.

The Freeman Mfg. Company, Detroit, has been incorporated with $5,000 capital stock by Elmer L. and George D. Freeman. The new company will manufacture surgical supplies.

The Electric Nail Company, Battle Creek, Mich., has been incorporated with a capital stock of $300,000

to manufacture nails. The new company has placed a contract for the erection of a plant.

The Bent-Rim Company, Lowell, Mich., has begun an addition to its plant, 50 x 50 ft., two stories.

The entire plant of the Saginaw Wood Products Company, Saginaw, Mich., was destroyed by fire May 3, entailing a loss estimated at $75,000. The equipment destroyed consisted of specially designed woodworking equipment and power plant apparatus. The rebuilding of the plant has not yet been decided upon.

The Gerline-Myers Brass Foundry Company, Kalamazoo, Mich., whose incorporation was recently announced in this column, is having plans prepared for the erection of its foundry plant, which will be 60 x 100 ft. Otto Gerline is general manager. The name of this company was erroneously given as the Geyerline Meyers Company in a recent issue of The Iron Age.

The Crown Mfg. Company, Sturgis, Mich., is a new corporation which has been organized for the manufacture of a patented dump box. Homer F. Roth and G. W. Kirkpatrick are at the head of the new enterprise.

The property of the Dundee Hydraulic Power Company, Dundee, Mich., will be sold at receiver's sale June 11 by the Security Trust Company, Detroit, receiver. The company operates an electric lighting plant.

The plant of the Lapeer Gas Electric Company, Lapeer, Mich., was destroyed by an explosion May 7, entailing a loss of over $50,000. C. W. Smith is general manager of the plant.

The Michigan Railroad Commission has authorized the Michigan & Chicago Railway Company to increase its capital stock from $3,000,000 to $6,000,000., and to issue $3,500,000 additional bonds. The authorization covers the expense of providing terminals for the road at Grand Rapids, a hydroelectric power plant at Manistee, Mich., and various other extensions and improvements.

The Rodgers Iron Mfg. Company, Muskegon, Mich., manufacturer of sawmill machinery, steam pumps and iron castings, is in the market for the following second-hand machines in good condition. Two belt-driven air compressors, 110 lb. pressure, one 300-ft. and one 125-ft. capacity; three phase, 30 cycle, 440-volt induction motors in sizes ranging from 20 to 65 hp., and an exhaust belt-driven fan, 36 in. in diameter, for foundry use.

## Indianapolis

INDIANAPOLIS, IND., May 13, 1913.

The Miami Cycle & Mfg. Company, Middletown, Ohio, has leased a factory building at 229 East South street in this city and later will erect a new plant near the Indianapolis Speedway. The company proposes to spend $100,000 in additions to its business and for new machinery. It expects to manufacture about 25,000 motorcycles in the season of 1914.

The Esterline Company, Lafayette, Ind., maker of lamps and electric starters, will move its plant to Indianapolis.

The Page Electric Starter Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture starters for internal combustion engines. The directors are Carl M. Page, Leon T. Leach and A. C. Wells.

The new boiler house of the Indianapolis Light & Heat Company, Indianapolis, will be one-story brick and steel and will cost $80,000.

The Goldberg Oxyodine Machine Company, Indianapolis, has changed its name to the Goldberg Ozone Machine Company.

The Edwards Instrument Company, Indianapolis, manufacturer of surgical instruments, has increased its capital stock $50,000.

The Hoosier Mfg. Company, Newcastle, Ind., has increased its capital stock from $95,000 to $750,000.

The United Indiana Stone Company, Bloomington, Ind., has been incorporated with $300,000 capital stock, to quarry stone. The directors are G. D. Thornton, W. G. Frost and C. B. Marshall.

The Manufacturers Agency, Fort Wayne, Ind., has been incorporated, with $10,000 capital stock, to deal in contractors' supplies. The directors are J. E. Ford, L. H. Ford and W. N. Ballou.

The Indiana Brass & Foundry Mfg. Company, South Bend, Ind., has been incorporated with $10,000 capital stock to manufacture brass products. The directors are Samuel J. Smethers, Teopihl Bednarowicz and Floyd A. Deahl.

The Stedmans Foundry & Machine Works, Aurora, Ind., has increased its capital stock $75,000.

The West Lebanon Electric Light, Heat & Power Company, West Lebanon, Ind., has been incorporated with $10,000 capital stock to supply light, heat and power. The directors are William A. Hunter, Frank Burge and Charles Amos.

The Maxwell-Newcastle Mfg. Company, Newcastle, Ind., has been incorporated with $50,000 capital stock to manufacture automobiles and parts. The directors are James W. Wellington, Romney L. Wilson, Harry Wilder, Russell Willson and Frank C. Olive.

The Union City Electric Company, Union City, Ind., has been incorporated with $100,000 capital stock to supply electric light and power. The directors are C. J. Ruebling, H. S. Perrigo and A. N. Thomas, all of Chicago.

The Gary Mill-Work Company, Gary, Ind., has been incorporated with $31,200 capital stock to do mill work. The directors are E. Sunbery, H. Call and C. F. Rush.

## Wheeling

WHEELING, W. VA., May 13, 1913.

The Preserving Timber Company is building a large plant at Kenova, W. Va., for creosoting railroad ties. It will have a capacity of 3,000,000 cross ties per day.

The R. & E. Singing Picture Company, Wheeling, W. Va., has been incorporated with a capital stock of $250,000 to manufacture phonographs, talking and moving picture machines. The incorporators are T. A. Westmyer, Charles W. Ebeling, H. H. Dunlevy, George E. House, all of Wheeling.

The Camp Glass Company, Mt. Vernon, Ohio, making hand blown window glass, will move its plant to Huntington, W. Va., having purchased 5½ acres of land there. A $100,000 factory will be erected.

The Huntington Mattress Company, of Huntington, W. Va., capitalized at $50,000, is building a two-story structure, 40 x 120 ft. Later a permanent building 60 x 100 ft., four stories, will be erected. Modern machinery will be installed. S. M. Croft is president.

The J. G. Hoffman & Sons Company, Wheeling, W. Va., is doubling the capacity of its tannery at Elkins, W. Va.

The Huntington Drilling Company, with chief works in Huntington, W. Va., and Lawrence County, Ohio, was chartered with $10,000 capital stock by the following: G. C. Ralston, F. S. Figley, David Fox, A. L. Bastianelli, J. S. Warick, all of Huntington.

## Milwaukee

MILWAUKEE, WIS., May 12, 1913.

The inquiry for tools and other equipment continues good and while actual bookings consist principally of single or small lots, as for some time past, the business is, in the main, satisfactory. The problem of deliveries according to specifications of dates is still a problem, but as the season advances the manufacturers are beginning to see light and, unless there is an unusually heavy rush in the near future, the crowded condition of shops will be overcome soon. Gasoline engine manufacturers are coming into the market for new equipment, due to the general expansion in this particular field. Jobbers in new and second-hand tools report that their stocks are being cleaned up rapidly by sales to garages and small machine shops. New machines are replacing old equipment so rapidly, however, that the improved second-hand market is greeted with satisfaction.

Fred Blocki & Co., Sheboygan, Wis., manufacturers of farm implements, have broken ground for an entirely new plant, consisting of a main shop, a foundry, and a combined finishing room, assembling shop, warehouse and office, to be located at the Eighth street bridge. The present works at Michigan avenue and North Ninth street have been outgrown. All buildings will be of steel and brick construction. In its new location the firm will have its own sidetrack and dock facilities.

Consumers of malleable castings at Oshkosh, Wis., have asked the local Chamber of Commerce to investigate the proposition of establishing a malleable foundry. Secretary L. K. Bronson is now looking over the field to view the possible market in the vicinity, costs, production, investment, etc. It is proposed to organize a company with Oshkosh capital to erect and operate the foundry.

The George J. Meyer Mfg. Company, 578-586 Clinton street, Milwaukee, manufacturers of boilers, tanks, etc., is preparing to erect a large addition 140 x 150 ft. of steel and brick construction, three stories, on a space adjoining its present shops. The company was organized in 1904 and purchased the plant and business of the Davis Bros. Boiler Works.

The American Engineering Company, Sheboygan, recently incorporated for $50,000, will erect a plant on South Fourteenth street, near Indiana avenue, to be devoted to welding and cutting operations, repairs, and general machine business. Tentative plans call for three buildings of steel, brick and concrete construction. E. M. Parmelee, D. D. Rowlands and W. B. Lucas are the principal stockholders.

## The Central South

LOUISVILLE, KY., May 13, 1913.

Conditions in the machinery business in this market are considerably improved, the demand having taken a turn for the better. The number of prospects has materially increased, and when these are cashed in in the form of sales the records of manufacturers and agencies will look very much better. Boiler business has been exceptionally good of late, several of the leading concerns having been forced to run overtime to take care of work which had been scheduled for current delivery. The electrical equipment men are busy, and report excellent prospects. Illustrating the importance of the farmer as a consumer of machinery, large houses supplying that trade with gasoline engines, pumps and similar equipment report a slacking up in the amount of business being done on account of the farmers being completely occupied with their work in the field, which has been delayed by the tardy spring.

The Jeffersonville, Ind., reformatory, across the river from Louisville, will install two 250-hp. Babcock & Wilcox boilers, the contract for this equipment having been let recently.

The Louisville Board of Trade is urging the flour milling firm of Eberts & Bro., Jeffersonville, Ind., which recently suffered the loss of its plant by fire, to rebuild here. Prospects favor this being done, as the concern has already decided not to rebuild on the former site.

The Crosthwait Lock & Mfg. Company, Georgetown, Ky., has filed articles of incorporation, with a capital stock of $35,000. The incorporators are H. M. Taylor, Victor Howard and J. W. Osborne.

The H. M. Page Log & Lumber Company, Lexington, Ky., has been incorporated with $25,000 capital stock by H. M. Page, L. G. Strode and L. M. Moore, and plans the erection of a sawmill near that city.

The B. F. McCormick Lumber Company, Winchester, Ky., will install 10 individual motors in its planing mill, having contracted with a local central station for current to take the place of steam power heretofore used.

Tyler Stone, Providence, Ky., is in charge of a project to establish a waterworks system there, foreign capital having been interested in the proposition.

The Hardy Buggy Company, formerly located at Paducah, Ky., and more recently consolidated with the Brown Buggy Company, Dallas, Tex., has decided to return to Paducah, and W. T. Hardy, president of the concern, is planning the erection of a new factory there.

The Ashland Steel Company, Ashland, Ky., is reported to be contemplating substantial improvements in its plant, in addition to those recently made at an expense of $100,000.

The city of Elizabethtown, Ky., is to install a motor-driven steam pump at its waterworks, and the plant will be operated hereafter by the Kentucky Utilities Company, Lexington, Ky. The latter company is to enlarge the electric light plant at Elizabethown so as to supply day and night current.

The Mitchell Wheel Company, Marietta, Ohio, suffered $10,000 loss by fire at its spoke factory at Hohenwald. The plant will be rebuilt.

The Hydro-Electric Power Company, Rogersville, Tenn., will be in the market for a 50-hp. gasoline engine to be used in connection with an electric light plant. V. G. Hall is general manager of the company, which plans to start operations in the near future.

The F. & O. Cedar Works, Nashville, Tenn., is in the market for grinding machinery for use in connection with a wood distillation plant. Oil is to be extracted from cedar refuse.

County officials at Cleveland, Tenn., will require machinery for road construction work. Commissioner G. L. Hardwick may be addressed for information.

Merrill B. Parker, Chattanooga, Tenn., is asking for prices on a 40-hp. and an 8-hp. electric motor, both used. The specifications provide for direct current, 125-volt motors.

The city of Paris, Tenn., will enlarge the capacity of its electric light plant, probably installing an additional unit of 300-kw. capacity. M. W. Younkin is superintendent in charge of water and light plants in Paris.

Prices on an electric elevator are wanted by Daniel A. Mossman, Huntington, W. Va.

The Electrical Supply Company, 125 Camp street, New Orleans, La., is in the market for a used generator of 75-kw. capacity.

The Blowers Lime & Phosphate Company, St. Petersburg, Fla., is in the market for a 25-kw. generator, as well as five motors of varying capacities.

G. M. Buhrman, Gala, Va., in charge of the installation of an electric-light plant at Eagle Rock, Va., will purchase a 40-kw. alternating current generator, with switchboard, transformers, etc. An ice machine will be installed in the same connection.

The Chipley Light & Power Company, Chipley, Fla., will receive bids until May 20 on the construction and equipment of an electric light plant. An engine, generator, switchboard, transformer, etc., will be needed. The Solomon-Norcross Company, Atlanta, Ga., is the engineer in charge.

W. A. Stark, head of the W. A. Stark Lumber Company, Memphis, Tenn., will install a hardwood sawmill with a daily capacity of 30,000 ft. at Bledsoe, Ark.

The W. P. Brown & Sons Lumber Company, Louisville, Ky., has purchased two bandmills of Fay & Egan and Allis-Chalmers' manufacture, respectively, for installation in a plant at Fayette, Ala.

The C. C. Mengel & Bro. Company, which manufactures mahogany lumber and veneers, will have the details of plans for enlarging its mill in Louisville, Ky., ready in the near future. Clarence R. Mengel is president of the company.

## Birmingham

BIRMINGHAM, ALA., May 12, 1913.

Business neither in machinery nor in machine tools has been as good in May as in January and February, but it is satisfactory and in excess of that of this time last year, and much better than the average for this season. The special demand is for steam and gasoline engines and pumps and is principally from the contractors and the mines, a trade that has been in a steady and large volume during the entire year. Woodworking machine tools are not active. Inquiries from sawmills are scattered.

The city of La Grange, Ga., has bought a site and will erect an abattoir. John D. Edmundson is mayor.

The Southern Food Product Company, Detroit, Mich., which has other factories in Georgia, will expend $50,000 in building a factory to can fruits and other farm products in Macon, Ga. A site has been chosen and work on the plant is to start soon. E. M. Henson, Detroit.

The Orlando Light & Water Company, Orlando, Fla., plans the establishment of a cold storage plant and will increase the capacity of its ice plant from 25 to 60 tons.

The Atlantic Compress Company, W. W. Robinson, manager, Atlanta, Ga., will build a $70,000 cotton compress on Hutchinson Islands, terminals of the Seaboard Air Line, near Savannah, Ga.

The Florida Hydraulic Brick Company, Bradentown, Fla., has been incorporated with a capital stock of $25,000 by J. W. Willis, A. J. Bear and E. F. Atwood, the latter of Petersburg, Va. It purposes to build a plant for the manufacture of concrete blocks, brick, etc.

George S. Leatherburry, Mobile, Ala., will rebuild its dry kilns recently burned on property in Mississippi.

The Oglethorpe Oil & Fertilizer Company, Athens, Ga., has applied for papers of incorporation with a capital stock of $25,000, and privilege to increase to not exceeding $100,000. It will erect a fertilizer and cotton seed oil mill. Harry and M. S. Hodgson, F. A. Lipscomb and others.

The Hanks Foundry Company, Rome, Ga., will build a new plant on a 3-acre tract recently purchased. It will have double the capacity of its present stove and range manufacturing plant.

The Destructor Company, New York, will install an electric generating plant with a capacity of 26,000

kw. in connection with the installation of a $375,000 crematory at Atlanta, Ga.

It is understood that J. M. Garvin and associates, the purchasers of the properties of the Southern Car Wheel Company, will rebuild the furnace at Tallapoosa, Ga.

The Frazier Gin Company, Camilla, Ga., has been incorporated with a capital stock of $6,000 to operate cotton ginnery. W. B. Brooks, W. B. Frazier and A. J. Frazier are the incorporators.

The Fish Gin Company, Fish, Ga., has been incorporated with a capital stock of $6,000 by J. M. Baldwin, J. M. Hamrick and W. H. Whitehead.

B. W. Blount, Jacksonville, Fla., Jack Williams, Citra, Fla., and L. W. Danzler, Gulfport, Miss., will probably rebuild the $100,000 sawmill plant at Edenfield, Fla., recently burned.

## St. Louis

ST. LOUIS, MO., May 12, 1913.

The tendency toward conservatism is holding down anything like large extensions in manufacturing lines, but there is enough doing to justify replacements and the installation of peremptorily necessary equipment. As a result the dealers are in a fairly good frame of mind over their aggregate business. There is some request for second-hand machinery, but nothing especially striking. Electrical lines are being pushed up somewhat by the approach of summer fan business, while hydroelectric development is improving power demands. Similar conditions exist in oil and gas development fields. All things considered, the market is in a reasonably satisfactory state.

The Missouri Pacific-Iron Mountain system has decided upon the purchase of 17 new engines. Seven will be of the Mountain type, five of the Pacific type and five will be Mikados for heavy freight service, the others being for passenger use.

The Alex. Kilpatrick & Sons Foundry Company has taken out a permit for an addition to the plant at St. Louis to cost, exclusive of equipment, about $5,000.

The Ash Grove Milling & Electric Company, Ash Grove, Mo., has been incorporated with $50,000 capital stock by M. L. Weygandt, W. H. Alburty and E. J. Scott, to equip a mining and power plant on property controlled by them.

The Keystone Iron & Metal Company, St. Louis, with $12,000 capital stock, has been incorporated by W. J. Brennan, Charles G. Jenkins and Benjamin Dribbens, to deal in machinery and also in iron, metal, etc.

The J. C. Bulis Mfg. Company, with $75,000 capital stock, has been incorporated by J. C. Bulis, Robert Gaylord, H. H. Scott and Paul A. Laichinger, of St. Louis, to operate a corrugated paper box and supply factory, announcement of whose preparation was recently made.

The improvements recently announced for the electric light plant at Conway, Ark., will involve an 18 x 36-in. Corliss engine and 200-kva. generator, for which bids will be received until May 15 by E. V. Leverett, superintendent.

The Marvell Light & Power Company, Marvell, Ark., under the direction of F. H. Webster, engineer and superintendent, will equip a plant of 100-hp. capacity to cost with generators, power plant, etc., about $12,000.

A. S. Aull and associates have plans for the equipment of a public service light plant at Auburn, Ky., and are in the market for electric equipment and power plant.

The Weber Drilling Company, Dewey, Okla., with $50,000 capital stock, has been incorporated by E. H. Weber of Dewey, and H. C. and M. U. Weber of Bartlesville, Okla., and will equip an extensive oil and gas drilling outfit at once.

O. T. Magee, Tylerton, Miss., has plans for a sawmill on timber property at Kokomo, Miss., just bought by him.

The Cotton Lumber Company, Shelbina, Mo., has increased its capital stock from $30,000 to $50,000 for the purpose of increasing its equipment.

The White River Phosphate Company, Little Rock, Ark., with $10,000 capital stock, has been incorporated by Ramson Gulley, J. M. Rieff and W. P. Gulley, and will equip to operate phosphate mines.

The Clooney Construction Company, Lake Charles, La., builder of boats, has plans for the enlargement of its plant and the purchase of additional equipment.

The Fulton Bag & Cotton Mills Company, St. Louis, has plans for the construction of a plant in the northern part of the city to cost about $300,000, conditioned upon the city's granting switching connections.

The Morrow Combination Cultivator Company, Woodward, Okla., has been incorporated with a capital stock of $20,000 by W. P. Morrow, R. F. Gaston and E. L. Leonard, and will equip a plant for the manufacture of cultivators.

The city of Madisonville, Ky., is in the market for machinery and other equipment incidental to the extension of its waterworks, etc.

Monroe City, Mo., will install a waterworks plant to cost about $78,000, under the direction of Burns & McDonnell, as engineers, of Kansas City, Mo.

The Moline Cement Products Company, Moline, Ill., with $20,000 capital stock, has been incorporated by James P. Pearson, J. B. Finley and Charles C. Loptien to equip a plant for the manufacture of cement products.

The Mount Pulaski Electric Light, Heat & Power Company, Mount Pulaski, Ill., has been incorporated with $40,000 capital stock by Ira Vail, D. M. and C. E. West to equip a public service plant.

The Portageville Mfg. Company, Portageville, Mo., has been incorporated with $13,000 capital stock by M. V. and W. B. Turner and J. B. Dreup to equip a general manufacturing plant.

The Hill Mfg. Company, St. Louis, with $10,000 capital stock, has been incorporated by H. H. K. Schwerdtmann, Charles Van Dyke Hill and W. C. Lewis to equip a plant for the manufacture of radiators, heating accessories, etc.

## Texas

AUSTIN, TEXAS, May 10, 1913.

All lines of business are feeling the beneficial influence of an exceptionally favorable season for crops. Unusual activity in electrical development continues in Texas, Arizona and New Mexico. The only bright spot in Mexico is in Tampico and the immediate territory where great progress is being made in oil development. It has been free, up to this time, from revolutionary disturbances. Advices from Tampico say that several hundred new buildings are now in process of construction and that much American and British capital is being invested in various lines of industry.

The Dallas Electric Company has been organized at Dallas with a capital stock of $7,000,000 for the purpose of doing a general lighting and heating business and operating a street railroad. The officers are: President, William F. Tucker, Chelsea, Mass.; clerk, Davis W. Snow, Portland, Me.

J. F. Miles will construct a system of irrigation to water a large tract of land near Alpine.

The Western Shingle Creosoting Company, Texarkana, is arranging to erect a plant at Houston for creosoting shingles. It will have a capacity of more than 300,000 shingles a day. The company has a capital stock of $600,000, and Don Cafferty of New Orleans, La., is at its head.

E. C. Holt and associates are arranging to erect a cotton mill at Wichita Falls with 20,000 spindles. Natural gas will be used for fuel.

The City Council of Nacogdoches has purchased the electric lighting and power plant of the Nacogdoches Light & Power Company. Improvements will be made to the property.

G. W. Mills and James Scott will erect a broom factory at Brownwood.

The City Electric Company, Belton, which was recently organized with a capital stock of $60,000, has taken over the holdings of the Belton Light & Power Company and the Belton Ice & Electric Company. The property consists of two electric light and power plants and an ice factory. Additional machinery will be installed and other improvements made to the plants.

An electric light and power plant and a waterworks system are being constructed at La Porte.

Daniel & Hogg will erect a brick manufacturing plant at Pleasanton.

John R. Allen of Fort Wayne, Ind., has begun the construction of a gas manufacturing plant at Waxahachie, Texas. It will be ready for operation about August 1.

The Drake-Branum Construction Company has been organized at Fort Worth with a capital stock of $50,000. The incorporators are W. B. Drake, H. M. Branum and W. D. Crothers.

The Cleburne Peanut & Products Company will erect a plant at Cleburne for manufacturing butter and other products from peanuts.

The Pecos Irrigation Company will construct a system of irrigation near Pecos. The parties interested are W. M. Huggins, W. W. Wilson and J. D. Robinson.

The Southern Traction Company has purchased a tract of 15 acres of land at Trinity Heights near Dallas, as a site for its railroad shops. Plans are now being prepared for the shops which will be erected at a cost of $100,000.

Moisnor & Seybold will erect a cotton gin at Temple.

The Quanah Oil Company is building a cotton gin at Chillicothe.

The Johnson City Iron & Roller Mill Company will erect a modern cotton gin at Johnson City.

The Coughran Gin & Mill Company is erecting a grist mill at Coughran.

The Texas Light & Power Company which recently acquired the holdings of the Italy Ice, Light & Water Company, Italy, is making important improvements to the property.

The Nebo Light & Power Company and the St. Johns Electricity & Power Company will erect hydroelectric plants near St. Johns, Ariz., for the purpose of supplying power for irrigation pumping plants and other industrial concerns of that section as well as to provide lights for St. Johns. The two companies are closely affiliated.

The Arizona-Egyptian Cotton Company will erect a cotton seed oil mill and a 10-stand cotton gin at Phoenix, Ariz. The development of the cotton growing industry in that part of Arizona has created the necessity for the proposed new plants.

The General Electric Company, represented by W. M. Hand of Kansas City, Mo., which has under consideration the construction of an interurban electric line to run between Cloudcroft and Artesia, N. M., will locate its hydroelectric plant which will furnish the power for operating the road at the falls of the Panasco River.

C. R. Jones is promoting the erection of a hydroelectric plant near Santa Rosa, N. M. It is planned to also construct a system of power transmission lines.

S. Pearson & Son, Ltd., will soon begin the erection of a large electric power plant at Tampico, Mexico. Important improvements will be made at La Barra, which is situated near the mouth of the Panuco River.

The Mexican Eagle Oil Company will soon begin the work of erecting a large oil refinery at Tampico. It is now constructing a small testing plant.

## The Pacific Coast

PORTLAND, ORE., May 6, 1913.

Machine tool business, while fair in the aggregate, still consists mostly of small orders, though there are occasional sales of single tools of rather expensive types. There is some garage business, and some tools are constantly being replaced by the numerous manufacturers of logging and mill machinery in this vicinity, improved labor-saving devices being generally in demand.

The general machinery market is in good shape, especially in the woodworking line. Orders for complete lumber and shingle mill outfits have been unusually numerous this spring, and several important projects are still to be heard from. There is also a great deal of railroad construction, especially of logging roads, and locomotives designed for this purpose are in good demand. Some hydroelectric machinery is being installed, and considerable interest is taken in electrical machinery of all descriptions, with a growing tendency to equip manufacturing plants with individual motor drive, even where current has to be generated by steam. General contractors' equipment is in very fair demand. Local building operations show some increase, and the crop outlook is very satisfactory in both grain and fruit-growing districts of Oregon and Washington. There is a great deal of figuring on fruit-canning and packing equipment, with indications that this year's sales will be unusually large.

Manufacturers of canning machinery are interested in the report that Libby, McNeill & Libby have bought out the Alaska Fishermen's Packing Company, Astoria, Ore., with canneries in Alaska, etc., valued at about $500,000.

The Portland branch of the Eccles & Smith Company reports the sale to a local firm of a 10-in. x 16-ft. extension Betts vertical boring mill.

Three large gold dredges are being constructed at Seattle, Wash., under the supervision of the Union Construction Company, San Francisco, for use in Alaska. The smallest will handle 1400 cu. yds. of earth a day, the others having each a daily capacity of 2000 cu. yds.

It is reported that Gillespie & Hanson, Seattle, Wash., who have orders for the construction of a number of Alaska dredges, have leased a site at Tacoma, where they expect to put up a large building and install machinery amounting to $6000.

It is announced that work will begin in about a month on the installation of equipment to double the capacity of the Washington Steel & Iron Company's plant at Leavenworth, Wash.

W. W. Lytle, patentee of a new type of barrel, is working on a project to establish a barrel and veneer package factory at Bellingham, Wash.

The Humboldt Cooperage Company, Arcata, Cal., is figuring on the installation of a steam turbine electric generator, with motors to operate its entire stave mill.

The St. Helens Creosoting Works, St. Helens, Ore., which started a timber-creosoting plant about six months ago, is planning to double its capacity.

The Smith-Powers Logging Company, Marshfield, Ore., has put in a lot of electric logging machinery.

The Hawley Pulp & Paper Company, Oregon City, Ore., is installing a complete new line of paper manufacturing machinery and a printing outfit for fruit wrappers.

Powerful stump-pulling machines of several designs are offered by local manufacturers, and are finding a good market in the interior, owing to the increasing value of logged-off land for agricultural purposes.

It is reported that the Liberty Copper Mining Company, operating near Chewellah, Wash., will build a 50-ton concentrating plant.

The Meese & Gottfried Company, San Francisco, handling transmission machinery, has taken a 10-year lease on the four-story building at Mission and Annie streets, to be used for offices, drafting rooms, etc. The new quarters will be occupied about June 15.

## Eastern Canada

TORONTO, ONT., May 10, 1913.

The Mississaga Pulp & Paper Company, Ltd., Toronto, Ont., has been incorporated with a capital stock of $2,500,000, to carry on the business of pulp and paper manufacturers.

The Fred Thomson Company, Ltd., Montreal, Que., has been incorporated with a capital stock of $100,000, to manufacture electrical machinery, supplies and accessories.

The Canadian Pacific Railway Company reports the following equipment orders placed in the past week: Canadian Car & Foundry Company, 84 box cars and 32 automobile cars; Barney & Smith Car Company, 131 box cars; National Steel Car Company, 41 box cars, and with the company's own Angus shops 2 second-class, 2 tourist, and 4 mail and express cars.

The incinerator for the town of Cobalt, Ont., which was recently destroyed by fire, will be immediately rebuilt.

The Mond Nickel Company, Sudbury, Ont., sustained a loss estimated at $50,000 to $100,000 when its building at Victoria Mines, containing electrical machinery, dynamos, etc., was totally destroyed by fire.

The Colonial Furniture Company, Strathroy, Ont., will make repairs and additions to its factory costing $15,000.

An addition will be built to the factory of Fox & Co., Toronto, costing $15,000.

The Massey-Harris Company, Toronto, has purchased a 200 acre tract of land adjoining Brampton, Ont. The company recently acquired the Deyo-Macey Engine Company of Binghamton, N. Y., manufacturer of gasoline engines, and it is the intention to erect a Canadian factory of the Deyo-Macey Company. It is the intention also to move the manure spreader department of the Johnston Harvester Company of Batavia, N. Y., to the new Brampton factory.

The City Council of Kingston, Ont., contemplates the erection of a coal gas plant costing $60,000.

The announcement has been made by the Brantford Roofing Company of Brantford, Ont., that it has purchased the Canadian rights of an American roof paint, and will manufacture it at Brantford. A building is now being erected, and within three weeks a plant will be in operation for the manufacture of such paint.

The Canadian Connelly Frog & Switch Company will locate between Fort William and Port Arthur. The plant will cost at least $100,000, and will manufacture railroad accessories. John E. Connelly, of Memphis, Tenn., is behind this new industry.

Work has been commenced on a factory to be erected at Windsor, Ont., by the Remington Arms-Union Metallic Cartridge Company, New York.

Charles Brown, of Brantford, Ont., and others have secured an option on the entire premises formerly occupied by the Farmers Binder Twine Company, and an organization is now being formed for the manufacture of hay-presses and other machinery.

The Barrie Milling Company, Barrie, Ont., is planning a $20,000 addition to its mill on Collier street. It has purchased property adjoining its mill and will erect a three-story mill thereon. The new mill will have a capacity of 150 barrels a day. Electric power will be installed.

The contract for the erection of a two-story addition to the Taylor Woolen Mills, Chatham, Ont., has been awarded. The building, which will be of fireproof construction, will be completed by July 1.

The J. W. Hewitson Company, Ltd., Toronto, manufacturer of shoes, it is announced, will move its entire plant to Montreal within a short time.

The Gorman Eckert Company, London, Ont., will erect a cannery at Leamington, Ont., to cost $25,000.

A factory costing $15,000 is planned by the B. F. Kastner Company, Stratford, Ont.

The Hough Lithographing Company of Toronto has purchased the Calliver Tannery proprety at Brampton, Ont., which will be remodeled and run by electric power.

The Hamilton Importing Company, Hamilton, Ont., will build a five-story warehouse to cost $40,000.

Additions and alterations will be made to the factory of Firth Bros., Hamilton, Ont., to cost $14,000.

R. C. Cummings contemplates building a grain mill at Ottawa, Ont., to replace the one destroyed by floods.

Plans will be prepared for an addition to the factory of the Dominion Bridge Company, Ottawa, Ont.

The Booth Felt Company contemplates building a paper box factory to be combined with the manufacture of felt at Gananoque, Que.

Plans are in progress for the erection of a printing plant costing $40,000 for the Lowe-Martin Printing Company, Ottawa, Ont.

The Victor Saw Works, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $40,000 by John W. Nesbitt, John G. Gould and Cecil V. Lang. It will equip a plant for the manufacture of saws, small tools, etc.

The Hamilton Cadillac Motor Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $40,000 to manufacture motor cars and other vehicles. James Nixon, Frank R. Newberry and James A. Sauriol are the directors.

## Western Canada

WINNIPEG, MAN., May 9, 1913.

There is a good seasonable movement of machinery. The local houses report the volume of business steadily increasing, promising to be considerably larger for this month than in April. Quite a few of the municipalities are preparing to make large expenditures this summer on waterworks and other municipal plants. The general industrial outlook is encouraging, notwithstanding the continued money stringency. In respect to the latter, it is confidently anticipated that conditions will be easier in the summer than in the spring months.

The Royal Farm Machinery Company, Ltd., Melville, Sask., has been organized to establish a large factory. Plans are now being prepared.

The Dominion Odic Company, Ltd., has signed a contract with the town of Estevan, Sask., to erect a factory to manufacture electric motors. The plant will cost about $50,000, and the company is said to have a capital stock of $1,000,000.

The city of Port Arthur, western Ontario, will spend a large amount of money this year on extensions to the waterworks plant. The commissioner of utilities is J. J. Hackney.

The City Commissioners of Regina, Sask., are calling for tenders for one pair of vertical feed pumps, capacity 7,500 gal. per hour, and one combined open heater and meter, 125,000 lb. feed water per hour. E. W. Bull is the superintendent of the light and power utilities.

The Industrial Iron Works, Ltd., Medicine Hat, Alberta, will erect a foundry plant this year, and $20,000 will be expended on machinery. The promotors are Joseph W. Hamilton and Floyd T. Richfield.

Plans are in progress for the linseed factory to be erected at Prince Albert, Sask., by the Great West Iron, Wood & Chemical Company, Ltd. The manager is Felix Frank.

Springett Brading & Co., Fort William, western Ontario, will erect a wood-working plant at a cost of about $6,000.

The Town Council of Strassburg, Sask., is planning to install an electric lighting plant. The secretary-treasurer is S. L. A. Smyth.

Plans are being prepared for a sash and door factory for Nelson & Foster, Winnipeg, Man.

The Canadian Stewart Company has secured from the Canadian Pacific Railway the contract for the erection of a 4,000,000 bushel extension to elevator D at Fort William, Ont.

John Hellberg and Otto H. Allsen will erect a machine shop at Melfort, Sask. A shipment of machinery is on the way for its equipment.

The Pembina Quarries, Ltd., has been formed with a capital stock of $150,000, to develop sandstone deposits existing on the main line of the Grand Trunk Pacific and Canadian Northern railroads, 65 miles west of Edmonton, Alberta.

J. E. Darymple, fourth vice-president of the Grand Trunk Railway, announces that the company will build a grain elevator with a capacity of 10,000,000 bushels at Prince Rupert. Construction will be started at once. This will be the first big elevator on the coast and indicates an intention on the part of the company to make Prince Rupert a grain exporting centre.

The Dickson Steel & Bridge Company, Edmonton, Alberta, has been incorporated under the laws of Alberta, and will erect a plant for the manufacture of structural steel in the suburbs of Edmonton.

## Government Purchases

WASHINGTON, D. C., May 12, 1913.

The Paymaster General, Navy Department, Washington, will open bids May 20, under schedule 5367, class 1, for one engine lathe; schedule 5385, class 31, one Rockford motor-driven direct connected No. 2 horizontal drilling, boring and tapping machine, and one double surfacing machine; schedule 5390, class 42, 12 combined furnace, boiler tube and smoke passage draft meters, one portable instrument for analysis of flue gases and two differential gas gauges.

The same department will open bids May 27, under schedule 6382, for furnishing and installing complete, one outside crane runway and one cylindrical steam disinfector.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids June 7 for furnishing one switching locomotive for use in the navy yard, New York.

The United States engineer office, Norfolk, Va., will open bids June 2 for constructing and delivering three motor-driven survey cruisers.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids May 6 for the following supplies:

Schedule 5331, class 35, two multiple spindle automatic screw machines—Bidder 99, National-Acme Mfg. Company, Cleveland, Ohio, $4,600.50.

Schedule 5336, class 41, one hand lever pipe vertical multiple spindle drill—Bidder 53, Walter H. Foster Company, New York, $2,050 and $2,150; 80, Kemp Machinery Company, Baltimore, $2,645; 85, Manning, Maxwell & Moore, New York, $1,900; 164, Fox Machine Company, Grand Rapids, Mich., $2,730.40.

Class 42, five turret lathes and two turret threading attachments—Bidder 53, Walter H. Foster Company, New York, $8,692; 69, Hill, Clarke & Co., Inc., Boston, Mass., units, part; 119, Prentiss Tool & Supply Company, New York, $6,347; 155, Warner & Swasey Company, Cleveland, Ohio, no total; 166, Jones & Lamson Machine Company, Springfield, Vt., $6,634.

Class 43, one medium size cut-off saw—Bidder 6, American Woodworking Machinery Company, Rochester, N. Y., $72; 52, J. A. Fay & Egan Company, Cincinnati, Ohio, $75; 73, Hall & Brown Woodworking Machine Company, St. Louis, Mo., $60; 80, Kemp Machinery Company, Baltimore, Md., $39.40; 85, Manning, Maxwell & Moore, New York, $100; 103, Oliver Machinery Company, New York, $92 and $99; 119, Prentiss Tool & Supply Company, New York, $36.50; 135, H. B. Smith Machine Company, Smithville, N. J., $57.

Class 44, one combination band scroll and re-sawing machine—Bidder 6, American Woodworking Machinery Company, Rochester, N. Y., $260; 52, J. A. Fay & Egan Company, Cincinnati, Ohio, $525 and $325, alternate; 80, Kemp Machinery Company, Baltimore, Md., $158.75; 85, Manning, Maxwell & Moore, New York, $434 and $315, alternate; 119, Prentiss Tool & Supply Company, $138.60; 135, H. B. Smith Machine Company, Smithville, N. J., $500.

Class 45, one large universal woodworker—Bidder 52, J. A. Fay & Egan Company, Cincinnati, Ohio, $425; 60, Greenlee Brothers & Co., Rockford, Ill., $650; 80, Kemp Machinery Company, Baltimore, Md., $310, $321.50, alternate, and $343.75; 85, Manning, Maxwell & Moore, New York, $640; 119, Prentiss Tool & Supply Company, New York, $350.38.

Schedule 5337, class 51, one combined bar and angle cutter and punch—Bidder 80, Kemp Machinery Company, Baltimore, Md., $1,047; 85, Manning, Maxwell & Moore, New York, $870; 107, Henry Pels & Co., New York, $865.50; 157, Wiener Machinery Company, New York, $860.

## New Tools and Appliances

*This is essentially a news department for which information is invited*

**Holder for Emery Wheel Dressing Diamond.**—Montgomery & Co., 105 Fulton street, New York City, have brought out a tool known as the Strong diamond holder which is designed for use in dressing emery wheels. A cut diamond shaped with six points all of which are available for cutting is used with the holder, the diamond being held in the shank by a threaded cap and a copper plug. As the cap is screwed up the diamond is securely held in place between the cap and the copper plug by the tension of a spring. The advantages claimed for this design are that the diamond cannot work out of the tool as long as the cap is kept in its original position, and the diamond can be placed in the tool in any position to bring any of its six points into the cutting position, an arrangement which adds greatly to the wear of the diamond. The tension of the spring which will automatically release the pressure from the diamond also reduces the possibility of breaking the diamond, since it cannot be clamped too tightly or forced too hard against the work.

**Cylinder Boring Machine With Three Spindles.**—The Newton Machine Tool Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa., has brought out a three-spindle cylinder boring machine, in which the spindles and the bars are made integral, the cutter heads which are driven by broad face keys being attached directly to the ends of the boring bars. The heads are 6½ in. in diameter, 28 in. long and have a No. 7 Morse taper. There is a double taper bearing in front for the spindles and in the rear there are bushings having parallel internal and taper external bearings designed to compensate for wear and facilitate realignment. Bronze spiral gears and a hardened steel worm drive each spindle, the main body of which is 6 in. in diameter and has a bearing 29 in. long. The work table is solid with a saddle which is 6 ft. long and 40 in. wide. The finished surface for clamping the work measures 26 x 48 in. The machine is driven by a Westinghouse electric motor having a speed range of from 600 to 1200 r.p.m., the spindle speeds ranging from 10.31 to 20.62 r.p.m. The feeds for the saddle range from 0.0119 to 0.081 in. per revolution of the spindle and a fast power return of 4.44 in. per revolution of spindle is provided.

**Relieving Attachment.**—The Bickford Machine Company, Greenfield, Mass., is manufacturing a relieving attachment, consisting essentially of a shaft running on eccentric centers and carrying a sleeve upon which the cutter that is to be relieved is mounted, a 64-tooth gear attached to the sleeve and a 60-tooth gear free upon the sleeve and a pinion mounted on an arm carried by an eccentric shaft and meshing with both gears. The smaller gear is attached to the inside of the gear guard and since it cannot revolve around the sleeve upon which the cutter is mounted, both it and the sleeve are rotated, the motion being the result of the difference in the number of teeth on the two gears. The eccentric shaft also carries the cutter around in a circle, the motion being toward and away from the tool as well as up and down. The teeth on the circumference of the idle gear are unequally spaced, 18 teeth being in one quarter, while the other three quarters have 42 teeth. The result of this unequal spacing causes the cutter which is being relieved to revolve in the opposite direction to that in which the lathe is running during the time that the cutter is passing from its point nearest the tool to the lowest point of its travel and in the same direction as the lathe during the remainder of the cutter movement. As the result of one planetary revolution, the cutter will have advanced one-sixteenth of a revolution when it again reaches its position nearest the tool. Thus the cutting tool can be run directly up to the face of the tooth and the cutter will then revolve backward as it recedes from the tool, thus making it possible to have teeth which are very wide with relatively narrow spaces between. An adjustment is provided so that the tooth can be set in the correct relative position to the tool before starting the cut.

**New Slip Ring Motor Controller.**—For use in connection with pressure regulators and float switches the Cutler-Hammer Mfg. Company, Milwaukee, Wis., has brought out a new type of automatic controller or self-starter designed particularly for use with two or three phase slip ring induction motors driving centrifugal pumps or apparatus with similar load characteristics. The acceleration is controlled by resistance in each phase of the rotor circuit which is balanced on all steps and is cut out of the circuit by magnetic switches. The closing of these switches depends upon the action of relays in the rotor circuit which allow successive steps of resistance to be cut only after the current has dropped to a safe value and the motor properly accelerated. These controllers are of the multiple solenoid type, are entirely self-contained and are made in standard capacities up to 200 hp. The primary switch and magnetic starting switches are of open construction of the clapper type. The current relays have three coils connected in the secondary circuit with the starting resistance and carrying the starting current. The plungers of these relays are controlled directly by the starting current and the rate at which the motor is accelerated can be adjusted by varying the spring tension of the relay plungers. The secondary starting resistance is of the cast grid type.

**Flexible Hose.**—To overcome the common difficulties of kinking, flattening, puncturing, etc., the H. W. Johns-Manville Company, New York City, has developed a type of flexible hose, consisting of a rubber hose protected by metal armor in the form of a ribbon with crimped edges. This ribbon when wound forms a continuous interlocking flexible spiral, the interlocking construction resisting the curvature and thus eliminating sharp bends. Unless both the outer armor plate and the inner tube are punctured at the same time, it is claimed that the hose cannot be put out of service, and the latter is not subjected to any pulling strain, since the armor is stretched to its maximum length before the rubber hose is inserted. Any length of hose can be furnished and the maximum diameter is 12 in.

**A Cone Clutch with Two Pieces.**—A cone clutch having the minimum number of pieces, two, has been designed for general machinery use by Sterling Elliott, Newton, Mass. Both parts, the casing or band and the cone or spider, are simple castings. The hub of the band is bored and faced and the cone surface turned, while the spider has a finished hub and rim, the latter being sawed into four sections. In addition to the use of the minimum number of parts the thin section used in the web or arms of the cone is another special feature. It is pointed out that this arrangement produces a slight toggle action as the clutch is engaged by the slight springing back of the cone rim which gives a powerful and yet easy grip, while when the clutch is disengaged a similar spring of the web tends to reduce the diameter of the rim surface and thus the clutch lets go readily.

**Box Joint Pliers With Slip Jaws.**—The latest addition to the line of small tools made by the Utica Drop Forge & Tool Company, Utica, N. Y., is a new line of pliers, having a joint of the box type, which provides a support at each end of the hinge pin. To give a parallel grip for all sizes of work within the capacity of the tool, one jaw is slightly curved.

**An Improved Monkey Wrench.**—A recent product of the Trimont Mfg. Company, Roxbury, Mass., is a drop forged steel monkey wrench in which the movable jaw instead of opening toward the handle to gain a longer leverage extends outward instead. There is a housing in the handle through which the jaw slides, and a nut guard which keeps the adjustment from shifting through jar or vibration is furnished.

**A 26-in. Cold Sawing Machine.**—The Newton Machine Tool Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa., has recently built a 26-in. steel foundry type cold metal sawing machine. The general construction is the same as the builder's standard line, the spur driving gears being made of hammered steel and the driving pinion teeth cut from the solid metal of the wormwheel shaft. The driving worm wheel is a bronze casting and the steel driving worm has roller thrust bearings. A 28-in. saw blade is used and the machine can cut gates or risers up to a maximum diameter of 8½ in. in one cut, while by turning the stock it is possible to operate on larger pieces. The saw blade has a tempered steel body with hardened teeth and retaining wedges. Ordinarily the machine is driven by a 10-hp. motor and the saddle has power quick return. Feeds varying from ⅞ to 1 in. per min. are available.

# Trade Publications

**Steel Sash.**—David Lupton's Sons Company, Allegheny avenue and Janney street, Philadelphia, Pa. Catalogue No. 7. This supersedes all previous catalogues and illustrations and descriptive matter explain the construction, use and operation of steel sash for sidewalls, the Pond continuous sash, truss and operating device and a line of steel partitions and doors, steel skylights and hollow metal windows. In addition to the views of these various specialties descriptive matter is included as well as views of installations. One of the special features is a set of engravings, showing the installation of the company's counterbalanced type of steel sash and steel partitions and the Pond truss at the Erie works of the General Electric Company. In addition to the hand type of Pond operating device, a motor-driven operating device is also included.

**Tools.**—Fayette R. Plumb, Inc., Bridesburg, Philadelphia, Pa. Catalogue and price list. This is the company's 1913 catalogue describing and illustrating a line of hammers, axes, edge tools, sledges, blacksmiths' and railroad tools, picks, etc. In compiling the catalogue an effort has been made to simplify as far as possible the work of ordering goods by grouping material according to classification and to abridge the information so as to eliminate waste of time and space, while at the same time the necessary information is furnished. In the heavy goods section the plan has been adopted of showing the actual sizes of tools regularly made, and the best selling weights are printed in heavy type.

**Autogenous Welding.**—Davis-Bournonville Company, Marion Station, Jersey City, N. J. Catalogue. Pertains to a line of oxy-acetylene welding and cutting apparatus. The various styles of generators in both the stationary and portable types are illustrated and described, followed by a description of the equipment which has been generally adopted for use in the navy yards. Illustrations and descriptions of the different kinds of welding and cutting torches follow, and devices for cutting material in irregular, round or oval forms are illustrated and described, as well as a machine for cutting holes in the web of rails or structural iron. One of these, the Oxygraph, which is intended for cutting steel at sharp angles as well as in curves, was illustrated in *The Iron Age*, June 20, 1912. Mention is also made of various regulating devices and a number of tables of useful information are included.

**Concrete Reinforcement.**—American Steel & Wire Company, 72 West Adams street, Chicago, Ill. Booklet. Calls attention to a new use of its triangle mesh wire reinforcement for concrete, which is in the building of concrete pavements and roads. A roadway of this type is bound together firmly by a layer of this fabric in practically the same way as a floor or ceiling. The use of the fabric prevents cracks from forming and also imparts strength to the concrete. Descriptions with cost data are given of the various roads that have been built, and there are a number of views of the roads in course of construction and also in their completed form. Specifications for pavements are included, together with tables of information on the kinds of wire regularly carried in stock and the quantities of material required to make a cubic yard of concrete.

**Air Compressors.**—Sullivan Machinery Company, Peoples Gas Building, Chicago, Ill. Booklet No. 112. Contains a summary of all the styles and capacities of air compressors built by this company. No attempt at description has been made and merely the principal dimensions and power requirements are tabulated. A few views are also included of rock drills and hammer drills, showing them in active service.

**Grates.**—Valley Iron Works, Williamsport, Pa. Pamphlet. Is a treatise on the economical burning of coal, showing how the fuel can be burned to secure the greatest economy, smoke prevention and ease with hand firing. A discussion of how these results are accomplished by the Ajax shaking and dumping grates is included. The grates are illustrated and briefly described, the views showing not only the complete grates, but also the various parts.

**Rawhide Pinions and Gears.**—New Process Gear Corporation, Syracuse, N. Y. Pamphlet entitled "Noiseless Gear Driving." Illustrates a number of uses of rawhide pinions in connection with the driving of different types of machines. The several kinds of pinions and gears are illustrated and considerable useful information regarding the use of these pinions is included, together with a brief description of the company's plant.

**High-Speed Steel.**—McKenna Bros. Brass Company, Pittsburgh, Pa. Mailing card. Shows four different types of drills and reamers made from Red Cut Superior high speed vanadium steel.

**Foundry Equipment.**—W. W. Sly Mfg. Company, Cleveland, Ohio. Catalogue. Illustrates and describes a line of foundry appliance which includes exhaust steel tumbling barrels, cinder and resin mills, dust arresters, foundry accessories, steel tote boxes, factory barrels and sand blast rooms, equipment and supplies. An illustrated description of the tumbling mills appeared in *The Iron Age*, January 5, 1911.

**Tool Steel.**—Firth-Sterling Steel Company, McKeesport, Pa.; Wheelock, Lovejoy & Co., 23 Cliff street, New York, agents. Several circulars. Call attention to a number of different kinds of steel, including die, chisel, tool, drill rod and blue chip high speed steels. In each of these circulars, illustrations are given of the tools made from the various steels and the work that has been accomplished by them.

**Engine Lathe.**—Von Wyck Tool Company, Cincinnati, Ohio. Describes a 16-in. engine lathe with patented apron gear feed. This tool is built with a three-step cone pulley and double back gears and also with a four-step cone pulley and a single back gear. Illustrations of both types of lathe are given, together with views of the apron, the taper attachment and a turret which can be supplied for mounting on the ways or the carriage.

**Industrial Uses of Gas.**—United Gas Improvement Company, Eleventh and Market streets, Philadelphia, Pa. April issue of a periodical issued by the Industrial Division of the company. Explains some of the ways in which gas will help in the economical manufacture of goods. Among those illustrated and described are the use of a water heater for heating jacketed kettles, tanks, ovens, potash and acid baths, etc., and heating metal rolls and the heads of stamping presses. Mention is also made of the use of gas engines operating with illuminating gas fuel for the driving of machinery in shops.

**Shoveling Machines.**—Myers-Whaley Company, 1204 Holston Bank Building, Knoxville, Tenn. Catalogue No. 10. Presents a brief description and a few photographs and drawings of a line of shoveling machines for underground and surface work. The machines are built in various types and can be used for any kind of shoveling which is now done by hand, provided that a sufficient quantity is handled to get economical results. An illustrated description of one of these machines appeared in *The Iron Age*, May 23, 1912.

**Engine Lathe.**—South Bend Machine Tool Company, South Bend, Ind. Pamphlet. Contains instructions by a practical machinist on how to care for, operate and erect a screw cutting engine lathe. Views of the lathe with the principal parts numbered are given, followed by a list of the parts and their names numbered to correspond with the drawings. Instructions are next given for the unpacking and erection of the new tool, and this is succeeded by the necessary information on how to operate it. The text is supplemented by numerous engravings and drawings and a number of useful hints are also included.

**Pyrometers.**—Hoskins Mfg. Company, 453 Lawton avenue, Detroit, Mich. Bulletin No. 3. Describes a line of thermo-electric pyrometers, and in addition contains a considerable amount of information of interest to the pyrometer user. The description of the pyrometer is quite complete and the text is supplemented by numerous engravings. A number of applications of the pyrometer are mentioned and described, and mention is also made of accessories, such as protecting tubes for the thermo-couples, switch cabinets and inclosing cases, etc.

**Ball Bearings.**—Hess-Bright Mfg. Company, Philadelphia, Pa. Sheets No. 93 and 94. The first shows a pulley mounting for rope drive or hoisting sheave, in which the outer races are free to creep slowly around and an endwise clearance of approximately 0.01 in. is allowed between the race and the shoulders. The other sheet describes the extension of the employment of floating bushes to the ball bearing arbor of a heavy duty wood shaping machine. These bushes float in oil films, which act like dashpots to steady the spindle and insure smooth cuts by the elimination of vibration. A view of the bearing is given and its construction is described at some length.

**Mechanical Oil Pumps.**—Lunkenheimer Company, Cincinnati, Ohio. Form No. 572. Describes the Invincible line of mechanical oil pumps for use on valves and cylinders of steam engines and pumps of all styles. These pumps are made with from one to four feeds and their construction is described at length, the text being supplemented by halftone engravings and line drawings. An illustrated description of the lubricator appeared in *The Iron Age* February 13, 1913.

**Exhaust Valves.**—Harrison Safety Boiler Works, North Philadelphia station, Philadelphia, Pa. Folder. Contains a large chart or diagram showing the internal construction of the Cochrane multiport safety exhaust outlet valve, which was illustrated in *The Iron Age*, November 16, 1911. The valve can be used either as a back pressure valve for exhaust steam heating or drying systems or as an atmospheric relief valve in connection with vacuum condensers, and possesses as its distinguishing feature a number of small disks, each held to its seat by an independent spring, instead of a single large disk, the tension upon the springs being adjusted by a movable pressure plate.

**Silica Retorts and Settings.**—Improved Equipment Company, 60 Wall street, New York City. Bulletin No. 6. After a discussion of silicon and silica refractories, the manufacture of silica products is described and the advantages of using silica in gas benches is pointed out at some length, with a graphic comparison of the refractoriness of fire clay and silica. A brief description of the Doherty economizer bench is given and the text of the entire bulletin is supplemented by numerous halftone engravings.

**Electric Welding Machines.**—Eveland Engineering & Mfg. Co.mpany, 3224 Market street, Philadelphia, Pa. Leaflet. Shows a number of types of electric riveting machines, including universal, small and large portable and bench styles. The machine heats the rivet after it is placed in the rivet hole and sets it in one instantaneous operation.

**Corrosion of Steel.**—American Sheet & Tin Plate Company, Pittsburgh, Pa. Pamphlet. Contains a reprint of a paper entitled "Copper in Steel—the Influence on Corrosion," read at the recent annual meeting of the American Chemical Society. This paper was printed substantially in full in *The Iron Age*, April 17, 1913, and gives the result of a number of tests made by the company on roofs of open-hearth steel sheets, some of which had copper added to them.